TRADE LIBERALISATION, EMPLOYMENT AND THE DISTRIBUTION OF INCOME

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CERTIFICATE

This is to certify that the thesis entitled **"Trade Liberalisation, Employment and the Distribution of Income"** submitted by me in partial fulfillment of the requirement for the degree of **Doctor of Philosophy (Ph.D)** of this university, is my original work and it has not been previously submitted, in part or full, for the award of any other degree of this university or any other university.

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

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Contents

Chapter 1

Introduction

In recent years the impact of international trade on the distribution of income has been widely discussed by economists and policy-makers alike, mainly for two reasons :

(a) A wave of globalisation is sweeping across developing countries the world over[1]. All around the developing world one observes a restructuring of economic policies, with emphasis on reduced state intervention, privatisation and increased openness, making for greater integration of the domestic, with the world economy. In particular, trade liberalisation constitutes an integral part of such policies. As such, it is interesting to ask how the distribution of income will be affected in developing economies, as they dismantle barriers restricting the cross-border flow of goods and services, and trade more with the rest of the world ;

(b) Recently, especially in the context of developed countries like the USA and countries of Western Europe, the issue of the inter-relations between international trade and the distribution of income has been the subject of intense debate[2]. The decade of the 1980s saw a phenomenal increase in the volume of trade between the developed countries of the North (comprising mainly of countries of Western Europe and the US) and developing economies of the South (consisting of East and South-East Asian nations like China, Malaysia, Indonesia, Thailand, Korean Republic, Hong Kong, Taiwan, etc.). At the same time, the relative economic position of unskilled workers vis-à-vis that of skilled workers deteriorated across the developed countries that engaged in international trade with the labour-rich developing nations of Asia. In their quest for an explanation for this phenomenon, economists in general and trade

[1] See Nayyar (1995 and 2001) for a detailed discussion on the many facets of 'globalisation' policies.

[2] In this context it is interesting to note that the debate on the issue of international trade and income inequality is by no means new. In Nineteenth-century England, the debate on the repeal of the Corn Laws also focussed this issue. Then, the chief concern of economists such as David Ricardo, was the distribution of income between profits and rents on the one hand, and wages on the other. Thus, essentially Ricardo focussed on the relation between trade and *factor* incomes. However in this dissertation, our focus is on personal income distributions.

theorists in particular, saw a direct correlation between the deterioration in the relative living standards of the unskilled workers in the North and the growth in these countries' trade with the unskilled-labour abundant economies of the South. In fact, to many economists this appeared to be a rather obvious application of the Heckscher-Ohlin-Samuelson (HOS) theory of international trade in a real world situation (see for instance Wood, 1994 ; Sachs and Shatz, 1994 etc.). Their argument runs as follows. Imports (consisting mainly of low-skilled labour intensive products) from the developing world, lowered the price of these goods in markets within the developing nations. This, in turn, was primarily responsible for the fall in the relative wages of unskilled workers in these countries. The Stolper-Samuelson theorem, an important corollary of the HOS theorem, embodies this relation between commodity prices and factor prices. However, there is still considerable debate among economists on the issue of whether, either international trade, or technological change (mainly computerisation)[3] alone, or a combination of these two factors, can be held responsible for the general weakening of the relative economic position of the unskilled vis-à-vis skilled workers in the North. Basically this literature has served to revive interest in the issue of trade and income distribution, and to bring it in central focus in policy-debates across the world.

Our dissertation addresses the broad question, how does international trade affect the overall distribution of income within a *developing* economy, even as we examine a particular transmission mechanism via which greater openness to trade flows may affect the distribution of income. We ask specifically, is the process of structural change an important channel via which international trade affects the personal distribution of income within a developing country. The reason we focus on structural change is because according to Simon Kuznets (whose pioneering work remains till the present day the starting point for any work on personal income distributions), this is an extremely

[3]The 1980s decade saw an important technical change affect production processes across the developed world. This was the large-scale application of computers at all levels of the production process. This increased the demand for skilled (computer-literate) workers on the one hand, and rendered many (especially low-skilled) workers redundant, on the other. As a result, wages of skilled workers tended to rise, relative to that of low-skilled workers.

important factor affecting personal income distributions within an economy. We would like to clarify at the outset, that 'structural change' essentially refers to the process of industrial transformation of a developing economy.

In what follows we first discuss the objective and scope of this dissertation and then outline the broad structure of our main arguments.

Objective and Scope

In this dissertation we pose the questions, as countries engage in a greater volume of international trade, how does this affect the process of industrial transformation and via this route, how does trade affect the overall distribution of income within a developing economy. In the current era of globalisation and outward orientation, trade volumes may rise due to a variety of reasons. An obvious reason could be policies of trade liberalisation[4]. Further, a number of other forces such as improvements in technology that have led to reduction in transport costs and revolutionized information flows, growing importance of multinational corporations *inter alia*, have greatly eased the movement of goods across international boundaries and contributed to a growing volume of international trade across the globe. In this context it seems interesting to ask, as countries trade more and as export and import volumes rise, how does this affect the process of structural change, which could be an important channel via which trade affects the overall distribution of income within a developing economy. To answer this question we proceed as follows.

We begin with a discussion of what various authors have said on the relation between international trade and income distribution and then outline our approach and how this

[4] There are a whole range of policy alternatives at the disposal of governments, which can be used to control the flow of exports and imports. Arguably these various policy instruments can be classified into separate categories on the basis of their differential impacts on the overall distribution of income. However, we do not discuss this issue. That is we do *not* examine the distributional impact of alternative trade policy measures in this dissertation.

differs from the existing literature (Chapter 2). Next, we examine an important factor that affects the personal distribution of income within a developing country, viz., the process of structural change (Chapters 3 and 4). Then we study how international trade affects this process and through this channel, the overall distribution of income within a developing economy (Chapter 5). We end by presenting the main conclusions of our study (Chapter 6).

At each step of the analysis we first present our main analytical propositions and then try to verify whether there is empirical evidence in support of these ideas. In particular, we select a group of eighteen developing countries, consisting of ten Asian nations (Bangladesh, China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand) and eight Latin American countries (Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela)[5]. Each of these nations adopted policies of trade liberalisation (although at different points in time)[6]. As such, a study of these countries' experiences may reveal certain insights into the relation between international trade and the overall distribution of income, in the context of developing economies.

At this juncture we would like to point out that there is an extensive literature on the inter-relations between economic growth and income inequality (for recent surveys see Bertola, 2000 and Bruno et al., 1998). This analyses both, the impact of growth on equity and of equity on growth. The former literature primarily centers around the concept of the Kuznets curve[7]. On the latter issue, many recent papers analyse how the initial distribution of income affects rates of growth of output within an economy. In this context, a number of influential studies explore the linkages between distribution, human capital formation and growth (see e.g., Banerjee and Newman, 1993; Galor and Zeira,

[5] Our choice of this particular set of countries is dictated primarily by the availability of data, particularly data on income inequality. The details regarding the criteria for selecting countries in the final dataset are contained in Part A of the Appendix to Chapter 3, under the subsection, "The Final Dataset" (Page 74).
[6] Although the *exact* year such policies were introduced differs from country to country, all countries adopted theses policies at about the same time viz., the late eighties and early nineties decades.
[7] This literature is reviewed at length in Chapter 3 of our dissertation.

1993 and Galor and Tsiddon, 1994)[8]. The broad consensus in this literature seems to be that a more equitable distribution would lead to higher rates of growth[9]. All of these are extremely pertinent and important topics, however analysis of these issues lies beyond of the scope of our dissertation.

In this context it can be mentioned that the impact of alternate growth strategies on poverty has also been widely analysed (see for instance, Cornea et al., 1987 and Lipton and Ravallion, 1995). However, we are interested in studying changes in distribution of income *per se*, which by itself (and apart from poverty) remains an economic variable of immense importance[10]. A growing volume of political economy studies point out the importance of the distribution of income for determining political and economic outcomes at the aggregate level (see for instance, Alesina and Perotti, 1993; Alesina and Rodrik, 1994; Perotti, 1993 and Persson and Tabellini, 1994)[11].

We do not directly incorporate the effects of economic growth in our analysis, however we do recognise that the rate of growth, in particular differential sectoral growth rates would have an important impact on the process of structural change in general. Insofar as we focus on structural change in this dissertation, in effect we are studying one *channel*

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[8]In this literature the basic transmission mechanism running from distribution to growth can be summarised as follows. An unequal distribution of income constrains investment in education, particularly among the poor households. At the macro level this has an adverse impact on human capital formation and therefore on the overall rate of growth of output. The situation is further worsened in developing countries where credit markets are imperfect (due to the existence of informational asymmetries). Thus poor households cannot even borrow (as typically they lack collateral) for investment in skill formation.

[9] This contrasts with the earlier view of there being a tradeoff between growth and equity. In the earlier literature (see for instance, Galenson and Leibenstein, 1955), it was argued that higher income inequality would lead to higher rates of growth, primarily via higher rates of savings.

[10] We would like to clarify at the outset that in this dissertation we are interested in the distribution of *incomes* (in particular, personal income distributions). Thus we will not be addressing the broader definitions of the standard of living, which incorporate the notion of "capabilities" (for a discussion of these issues and generally for a discussion of the broader dimensions of inequality see Sen, 1997 and 2000).

[11]This literature identifies a number of channels via which the distribution of income may affect economic outcomes in general, and the rate of growth in particular. For instance, governments in highly unequal societies often adopt populist, re-distributive policies, resulting in high rates of taxation, which may adversely affect the incentive to invest and thus retard growth. Alternatively, in a more unequal society the richer groups possess greater lobbying power. As such, they might influence policy decisions that in turn tend to perpetuate poverty and inequality. For instance, they may lobby for preferential tax treatment, leading to over-investment in certain areas and serving to reduce growth rates in the long run. Also it has been argued that high inequality leads to political instability, greater uncertainty and hence lower rates of investment and thus growth.

via which economic growth may affect the distribution of income. There are other equally important ways in which growth may affect income distributions, such as the process of accumulation of savings and therefore the concentration of income earning assets among economic agents. Also as economic growth leads to the creation of employment opportunities, this might lead to a reduction of poverty and ultimately income inequality. However analysis of these issues lie beyond the scope of the present dissertation.

In what follows we outline the structure of the arguments developed in the thesis and highlight our main findings.

Outline of the Main Arguments

We begin with a critical review of the literature on the relation between international trade and the distribution of income (Chapter 2). We review two strands of this literature, where one focuses on factor income distributions, and the second on personal income distributions. The literature on trade and factor incomes has evolved mainly in the context of developed countries like the USA, where economists debate the nature of the connection between changes in the wage structure of skilled vis-a-vis unskilled workers, and the rise in imports of low-skill intensive goods from developing countries. The theoretical underpinning of this literature is primarily the Heckscher-Ohlin-Samuelson model of international trade. At this juncture we would like to make it clear, that the HOS framework relates international trade to the *functional* distribution of income. The Stolper-Samuelson theorem brings out how a change in traded goods prices (due to a change in tariffs, for example) would lead to a change in relative factor incomes. The relative factor incomes may refer to wages and rentals or to the relative wages of skilled and unskilled labour, depending upon the specifics of the model under consideration. In this dissertation we analyse the relation between international trade and *personal* income distributions (where 'personal' income distribution refers to income flows to individual's

or households' and not to factors of production). This is the primary reason we do not use the HOS framework directly for our analysis.

Next, we discuss the literature on trade and personal income distributions, as the focus of this thesis is also on personal income distributions. An important conclusion that emerges from a careful review of this literature is that this framework is not appropriate for analysing the factors affecting the overall distribution of income in the context of a developing country. In particular we show that the assumption of full employment of factors of production is problematic when applying this model in the context of developing countries, where unemployment (and underemployment) of resources, particularly labour, is a stark reality. Here we would like to emphasise an important point of difference between our approach and that adopted in this literature. The standard empirical approach in this body of work is to run multiple regressions (using either cross-section or panel data) with a measure of income inequality as the dependent variable and with a measure of trade openness and other variables as regressors. The 'other' variables represent what authors perceive as important determinants of income distribution and the exact variable(s) chosen differ across the studies. While this approach indicates the sign and statistical significance of the relation between trade and income distribution, it certainly does not throw any light on the specific channel(s) via which trade affects the distribution of income.

We now discuss our approach towards analysing the relation between international trade and the distribution of income. At this juncture we would like to stress that essentially our approach represents a departure from the existing literature in the following way. Most studies that examine the relation between trade and income distribution, are either based on a trade theoretic framework, or on a general equilibrium framework that, at some stage, makes the assumption of a small open economy, which faces given international prices of commodities. Such studies essentially ask, is there a relation between trade openness and income distribution, without explicitly discussing the nature of the transmission mechanism running from greater openness to change in income distributions. However we make no prior assumptions regarding the nature of the trade

policy regime prevalent in the economy. We carry out a two-part analysis where first we see how the process of industrial transformation is likely to affect income distribution within a developing economy. Next we study how trade affects the process of industrial transformation and via this channel the overall distribution of income within a developing economy.

We begin with the literature on the 'Kuznets Curve', which provides extremely important insights into the nature of the factors that tend to affect the overall distribution of income within a developing economy. In particular we study one of the factors that Kuznets argued would have extremely important implications regarding changes in personal income distributions within an economy. This refers to the process of industrial transformation of an economy. Kuznets's explanation (Kuznets, 1955) for the inverted-U shaped relation between income inequality and per-capita incomes has certain clear-cut implications regarding the relation between structural transformation and the pattern of income distribution within an economy. We analyse this issue in the context of a developing economy within a Lewisian (Lewis, 1954) dual economy framework. In our view, the Lewisian framework is particularly appropriate for analysing the process of industrial transformation of a predominantly agrarian developing economy. While Lewis (1954) is primarily concerned with the process of accumulation and economic growth in a developing economy with surplus labour, Kuznets (1955) focuses on the possible implications for changes in the overall distribution of income, as labour is absorbed from agriculture into the industrial sector.

Focussing on the actual structural change experience of a set of eighteen developing nations, we examine the nature of change in income distribution that occurred in these countries over a span of about thirty-five years (1960 to 1995). The empirical methodology we use is different from the standard approach adopted in the literature on the Kuznets Curve. In this literature, authors focus primarily on the relation between income inequality and per capita incomes. We argue that this tends to obscure the underlying process of structural change (or the 'Kuznets process') that actually causes the change in income inequality. In our empirical analysis we focus directly on the relation

between the overall distribution of income and changes in the sectoral composition of aggregate output and employment. This helps bring into clear focus, the actual forces that cause the changes in the distribution of income in the first place.

We also argue that essentially there are two main aspects of the process of industrial transformation that affect the overall distribution of income in the economy : (a) the absorption of labour into the industrial sector from the agricultural sector (or, in general, from the unemployed and/or underemployed workforce) and (b) the pace of technological progress in the industrial as compared to the agricultural sector. Implicit in Kuznets' arguments regarding the determinants of overall income distribution is the view that the process of industrialisation progresses via the absorption of labour from the agricultural sector. The impact of technological progress (especially uneven technological change across sectors) on the overall distribution of income, receives relatively little attention in his discussion. We focus on this issue separately and discuss the various implications of the process of technological change for change in the distribution of income. We argue that following a rise in labour productivity, the distribution of the fruits of enhanced productivity as between wages and profits tends to determine how technological change will affect the overall distribution of income. We also examine the experience of a selected group of developing countries in this respect, as we analyse the nature of technological change and try to relate this to the change in the overall distribution of income. An important point that emerges from our analysis is that the existence of an informal sector plays an important role in determining how inter-sectoral labour movements affect the overall distribution of income in the context of developing economies.

Having analysed the relation between structural change and income distribution (Chapters 3 and 4), we then turn to the relation between international trade and structural transformation. In essence we try to examine the hypothesis that structural change is the basic *channel* via which international trade affects the overall distribution of income in the economy. We argue that as countries liberalise their external trade regime, they engage in a greater volume of trade with the rest of the world. We then try to analyse how

greater openness to international trade affects the process of industrial transformation of a developing economy. In our view, the main factors that determine this are changes in the composition of the overall trade basket in terms of imports and exports and in the composition of exports and imports in terms of agricultural and non-agricultural products, following a rise in the volume of international trade. Finally we point out whether or not imports tend to replace domestic goods in the consumption basket of domestic consumers also has an important effect on how trade affects the structure of production within the economy. We focus on the actual experience of the eighteen developing countries, with respect to changes in the structure of output and in the extent of trade openness, as we try to analyse how the two variables are related in their case. This completes our chain of reasoning : we first examine how structural transformation affects the distribution of income within an economy, next we see how trade liberalisation is likely to affect the process of structural transformation and therefore the overall distribution of income within an economy.

Chapter 2

International Trade and the Distribution of Income : A Critical Review of the Literature

Introduction In this chapter we review the existing literature on the inter-relations between international trade and the distribution of income. Broadly speaking there are two strands of this literature. Essentially one focuses on the relation between international trade and factor incomes. This developed mainly in the 1990s, in the context of the USA and countries of Western Europe. First, we briefly examine the main issues analysed in this literature (Section 1). Next we discuss the literature on international trade and personal income distributions, which is directly related to our topic, and analyse critically the main conclusions that emerge from it (Section 2). We conclude by specifying the main features of our approach towards analysing this issue (Section 3).

1 A Brief Review of the Literature on International Trade and the Distribution of Factor Incomes

At the outset we want to clarify, that the literature we refer to in this section essentially explores the relation between international trade and the relative returns to factors of production – in this case the factors being skilled and unskilled labour. In particular, the bulk of the literature that we shall review focuses on the US labour market and examines the implications of international trade for the American wage structure. However in this dissertation we are interested in the personal distribution of income or overall income distribution, which takes into account individuals' incomes from all sources, i.e. wages, profits, rent and interest. As such we shall not dwell on the literature on factor income distribution in any great length. The reason we examine it is because the recent concern regarding the distributional implications of international trade really started off with this literature.

We first outline the broad context in which the distributional implications of international trade became an important topic of academic discourse in recent years (Sections 1.1 and 1.2). Thereafter, we discuss the main features of the analytical framework that is used to analyse this issue and outline briefly the various methodologies used in, and the main results obtained from empirical studies that focus on this issue (Section 1.3).

1.1 The Context Concern over the distributional impact of dismantling trade barriers is not new. Generations of economists and policy makers have been concerned with the question of how the liberalisation of international trade policies might affect employment and the distribution of income within the liberalising country. This concern is reflected in the writings of Adam Smith as he comments on the plight of 'infant' industries in the face of trade liberalisation : "if those high duties and prohibitions were taken away all at once, cheaper foreign goods of the same kind might be poured so fast into the home market as to deprive all at once many thousands of our people of their ordinary employment and means of subsistence" (pp. 435-436; Smith, 1937). In nineteenth century England this issue was at the forefront of policy discourse, with the nationwide debate on the Repeal of the Corn Laws. In this context, English economist David Ricardo advocated the repeal of the Corn Laws and the adoption of freer trade policies for England (Ricardo, 1812). Freer trade in agricultural goods would depress farm prices, relative to industrial prices. Thus income would be redistributed in favour of the industrial capitalists and away from the landlords in the countryside. Typically landlords did not undertake productive investments, unlike the industrial capitalists. As such this change in the distribution of income, Ricardo argued, would ultimately benefit England. This is one of the earliest instances of a policy debate on the issue of international trade and its impact on the distribution of income within the domestic economy.

In recent years, particularly in the 1990s, there was a revival of the academic debate on the distributional implications of international trade, mainly in the context of the USA

and developed countries of Western Europe[1]. Throughout the decade of the 1980s, the economic position of less-skilled workers deteriorated steadily across the developed countries of the 'North'. Over the decades of the 1970s and the 1980s there was a marked increase in unemployment in the manufacturing sectors of all industrialized countries. This was accompanied by a very uneven distribution of the burden of unemployment; unskilled and uneducated workers faced a far greater risk of unemployment than skilled and more educated workers. Where labour laws and minimum wage legislations were largely absent, unskilled workers found employment elsewhere in the economy, although at much lower wages. In such economies, like the USA, unemployment figures remained low but there was a marked rise in income inequality[2]. By contrast, in Europe where institutional arrangements prevented wages from falling sharply, countries such as France, Germany and Italy experienced little or even diminishing income inequality but higher rates of unemployment[3].

This period also saw a phenomenal increase in imports of cheap, manufactured goods from labour-abundant, developing countries of the South (such as China, Malaysia, Indonesia, Thailand, India, Bangladesh and Pakistan) to these countries of the developed North. In addition, the decade of the 1980s also saw widespread technological changes (particularly computerisation) sweep across production processes in the North. Both these factors, viz., imports of unskilled-labour intensive products from the South and skill-biased technological change affected adversely, the demand for unskilled labour in the North. Therefore, as economists and policy-makers attempted to explain falling living standards of the unskilled workers, they essentially debated, which of the two factors, among international trade and technological change could be held primarily responsible for these developments in the developed countries' labour markets. In this literature, however, there is relatively little discussion on the role of the restrictive macroeconomic policies which were put in place in most countries of Western Europe in the eighties

[1] In this context, for an insightful discussion of the various questions that can be raised on the issue of international trade and the distribution of income see Deardorff and Hakura (1994).
[2] The real hourly wages of men with 12 years of schooling dropped by about 20 percent between 1979 and 1993 (Freeman, 1995).
[3] The rate of unemployment was 2.9 per cent in Europe in 1973. From 1983 to 1991 however, the average unemployment rate rose to 9.3 per cent (OECD Jobs Study, 1994).

decade. As these policies sought to restrain inflation, they also tended to affect the labour market by slowing down the rate of growth of aggregate demand. It can be argued therefore, the restrictive policy regime also contributed to the problem of unemployment especially in the countries of Western Europe (for a discussion on these issues see e.g., Nayyar, 1996 and UNCTAD, 1995). With a fall in labour demand in general, less skilled workers would be particularly affected, as arguably, their lack of skills would limit their ability to switch between jobs.

1.2 The Debate There are two clear-cut positions taken by economists attempting to explain the falling living standards of unskilled workers in developed countries of the North (for a survey of these issues see, Burtless, 1995; Freeman, 1995; Richardson, 1995; and Wood, 1995). One group of economists argued that the development and spread of new technologies which had a bias towards a more intensive use of knowledge inputs favoured, in particular, the skilled workers in the North (see for instance, Berman, Bound and Griliches, 1994; Berman, Machin and Bound, 1996; Bound and Johnson, 1992; and Krueger, 1993). The skill-bias in the new technologies raised the productivity (and wages) and the overall demand for skilled workers[4], relative to unskilled workers, thereby strengthening the relative economic position of the former.

A second group of economists argued that the growth of imports of relatively cheap manufactured goods from labour-abundant developing countries (like China, Malaysia, Indonesia, Thailand, Korea etc.), to the developing world, was primarily responsible for the decline in demand for unskilled labour in the developed countries (see for instance Borjas, Freeman and Katz, 1992; Murphy and Welch, 1991; Sachs and Shatz, 1994; Wood, 1994; etc.). The implicit argument was that the imported goods replaced the domestically produced substitutes, in consumption baskets in the developed countries. To the extent these import-competing goods used unskilled labour relatively intensively, a cutback in their production affected adversely, in particular, the demand for unskilled

[4] At one level technological change has actually helped create job opportunities for the less-skilled. This point has received relatively little to almost no attention in the existing literature. Consider one such instance of technological change. In supermarkets across the developed world, bar-code machines at

labour. However even in this literature there is considerable dissent regarding the *magnitude* of the impact of trade. For instance, Krugman (1995) argues that even though trade with developing countries is likely to depress the demand for unskilled workers, yet such trade is unlikely to be a prime cause underlying the observed increase in wage inequality in the US. For trade with developing nations constitutes only a very small fraction of total trade (and an even smaller share of GDP) of the developed nations.

1.3 The Analytical Framework for Studies relating International Trade and Factor Income Distributions The discussion on the relation between trade and income distribution in the context of the US, essentially focused on factor income distributions[5]. The theoretical framework most commonly used in this literature is the 2 × 2 version of the Heckscher-Ohlin-Samuelson (HOS) theory of international trade (see Heckscher, 1949; Ohlin, 1933; and Samuelson, 1948 and 1949). In the 2 × 2 version of the HOS model used in this literature, the two countries are the North (i.e. all developed countries clubbed together) and the South (i.e. all developing countries clubbed together) and the two factors are skilled labour and unskilled labour[6]. In a two-factor world consisting of skilled and unskilled labour, it is assumed that the North is relatively abundant in skilled labour and the South in unskilled labour[7]. In this case the HOS theorem implies that the North exports skill-intensive products to and imports unskilled labour-intensive goods from the South. Analogously, the South exports unskilled labour-intensive goods and imports skill-intensive products from the North. Trade in manufactures between the developed world (USA and Europe) and the developing countries seemed to fit perfectly, the pattern predicted by the factor abundance theorem or the HOS theorem. As such, to

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payment counters are so equipped that those working at the counter require little 'skills', other than basic familiarity with the 3 Rs to qualify for this post.

[5] Factor income distribution essentially refers to the distribution of total income between economic categories such as wages, profits, rents and interest. In particular, in the context of the US, economists focus on the relative shares of skilled workers and unskilled workers in total wage incomes. In essence the focus in on the relation between international trade and changes in the *wage structure.* Personal income distributions refer to the distribution of total income among income earning households within the economy. In this case the focus in on the total incomes earned by households in a year, irrespective of the *source* of the income.

[6] In the standard textbook version of the 2 × 2 HOS trade model, typically labour and capital are identified as the two factors of production.

[7] In this framework, the implicit assumption seems to be that 'capital' is essentially a product, which uses skilled labour relatively intensively. As such, skilled labour abundance implies capital abundance.

many theorists, this appeared to be the most suitable framework for analysing the distributional implications of international trade (see for instance, Wood, 1994).

The Stolper-Samuelson (SS) theorem is an important corollary of the HOS theorem that embodies the distributional implications of a change in the trade policy regime (see Stolper and Samuelson, 1941). According to this theorem, under certain conditions[8], a reduction in tariffs would hurt the relatively scarce factor and raise the returns to the relatively abundant factor within the economy. That is, according to the SS theorem, in a country that is relatively abundant in skilled labour, a cut in tariff rates would tend to raise the skilled-unskilled wage ratio. This is precisely what was observed in the US over the decade of the 1980s, viz. a rise in the skilled-unskilled wage ratio. In 1963, the weekly wage received by a man in the 90th percentile of the income distribution was about 2.91 times the wage of a man in the 10th percentile of the distribution. This ratio rose to 3.0 by 1969, to 3.47 by 1979 and to 4.42 by 1989 (Kosters, 1994). Observing simultaneously, a rise in the skilled-unskilled wage ratio *and* a rise in unskilled labour-intensive imports, many economists (particularly trade theorists) concluded that trade related factors had in fact *caused* the fall in the relative wages of the unskilled workers.

There are two broad classes of empirical studies that attempt to verify the relation between international trade and factor incomes, on the basis of available data on the US economy :

(a) One class of studies directly attempt to test the empirical validity of the SS theorem (see for instance, Lawrence and Slaughter, 1993; and Sachs and Shatz, 1994). Now the SS theorem is essentially about the relation between relative commodity prices and relative factor prices. As such, these studies focus on relative price changes. Given that the skill-unskilled wage rate has risen in the US, these authors examine

[8] The main results of the HOS theorem and its corollaries hold under certain assumptions, such as : (a) perfect competition in the goods and factor markets, (b) constant returns to scale technology, (c) incomplete specialisation in production, (d) at least as many factors of production as there are goods and (e) full-employment of all factors of production.

whether the relative price of skill-intensive goods has also risen[9]. There is mixed evidence from these studies regarding the nature of change in relative goods prices. While Lawrence and Slaughter (1993) did not find evidence in support of the SS theorem, Sachs and Shatz (1994) found that relative prices did actually move in the 'right' direction and they concluded therefore that trade related factors were primarily responsible for the labour market trends observed in the US[10].

(b) The second class of studies focuses on the relation between trade volumes and the distribution of income. The basic logic of these studies is quite simple. Imports of low-skill intensive goods are seen as substituting for domestic production. As such imports serve to *reduce* the demand for low-skilled labour (as compared to say, a zero-imports situation) and thereby contribute to a reduction in the wages of low-skilled workers. Analogously, exports of skill-intensive products *raise* the demand for, and hence the wages of skilled workers. The basic empirical issue therefore is to estimate the comparative effects of exports and imports on the relative demands for and relative wages of skilled vis a vis unskilled workers. This is the basic principle underlying the 'factor-content-of-trade' methodology used extensively in these empirical studies (see e.g., Borjas, Freeman and Katz, 1992 ; Murphy and Welch, 1991; Sachs and Shatz, 1994; and Wood, 1994). These studies broadly conclude that international trade was an important factor in explaining the fall in employment of low-skilled workers in the US economy. In particular, Wood's study produces by far the largest estimates of the impact of trade on relative factor prices[11]. We would like to end with a comment on the factor-content methodology used in these studies. This approach draws upon the HOS theory, insofar as the *pattern* of trade between the

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[9] In the 2 × 2 version of the HOS model, with the assumption of a small open economy, it can be shown that relative factor prices change only when there is a change in relative goods prices. Given this, if the SS theorem were true (under the small open economy assumption), then if a change in relative factor prices is observed, it *must* be the case that relative goods prices have also changed.

[10] One reason for the difference in the estimates of relative price changes in the two studies was due to the fact that Sachs and Shatz excluded computer prices from their series of prices of high-skill-intensive goods. These authors argued that the massive decline in computer prices in the 1980s would tend to distort the overall pattern of price change in the US economy.

[11] Wood (1994) actually adopts a variant of the factor-content methodology where he makes several adjustments, especially for differences in production techniques between the developed North and the developing countries of the South. His calculations indicate that the net impact of North-South trade on manufacturing employment in the US is roughly ten times what standard factor content estimates imply.

developed and less developed countries is concerned (see e.g., Wood, 1994). However while this approach draws a link between trade volumes and relative factor prices, in HOS theory itself trade *volumes* do not play any role. Rather commodity prices determine factor returns within the 2 × 2 HOS framework. In fact with the assumption of a small open economy, good prices alone determine the prices of factors of production. In particular, in this model absolute factor endowments *do not matter* so far as factor price determination is concerned.

1.4 A Final Comment The literature surveyed above is not really relevant to developing countries. Nevertheless we survey it briefly, as this is what sparked off academic interest in the 1980s and 1990s on the entire issue of international trade and income distribution. We would like to conclude the discussion with the following comments.

First, our analysis is not based on the HOS framework primarily because this framework has clear-cut implications regarding the relation between trade and factor incomes. For instance, in a two good-two factor(labour and capital, say)-two country world, the HOS assumptions imply that a reduction in tariffs would raise the wage-rental ratio in the labour-abundant country. However, in this dissertation we are interested in personal income distributions, which is about income flows to households or individuals rather than to factors of production. For this reason, the HOS framework would appear inappropriate from our point of view.

Second, to our mind, the HOS framework is not entirely appropriate for analysing economic issues relating primarily to developing economies. This is because the assumptions of this model especially perfect competition, constant returns to scale, identical production functions across countries and full employment are far removed from the reality characterising such economies. In developing economies there is both open and disguised unemployment of labour and there are structural rigidities that restrict the mobility of resources across sectors; also, factors of production are not perfectly substitutable in use.

In the ultimate analysis, however, it is not as though the sorts of distributional effects predicted by the HOS model do not apply at all in the context of developing economies. Typically developing countries tend to be labour abundant and capital scarce. As such if labour intensive exports expand, it is likely that even in the absence of full employment, the share of labour in total output would increase. In a labour abundant country this would tend to make the overall distribution of income more egalitarian. Further we argue that, in the HOS model, structural change is an important way in which international trade affects the distribution of income (see Chapter 5, Section 1). The change in the structure of production and employment associated with, e.g., an expansion of exports can be referred to as 'structural change' within the HOS model. As such when we focus on the relation between trade and structural change, in essence we are examining an important mechanism via which trade affects factor incomes even in the HOS model.

2 A Review of the Literature on International Trade and the Personal Distribution of Income

In this section we first examine how the relation between international trade and personal income distributions is analysed in the existing literature (Section 2.1). Next we comment critically on the basic approach adopted in these empirical studies and conclude that this is not entirely appropriate for analysing this issue in the context of developing economies (Section 2.2).

2.1 The Literature on International Trade and Personal Income Distributions

Broadly speaking there are two kinds of, primarily empirical studies relating trade openness and personal income distributions. Both classes of studies use cross country data for econometric analyses where measures of income inequality are the dependent variables. The first draws upon a theoretical structure developed by Bourguignon and Morrison (1990) to determine the set of independent variables for the inequality regressions. Spilimbergo et al. (1997) and Savvides (1998b) are two studies that fall in

this category. The second class of studies simply regress income inequality on measures of trade openness and macroeconomic indicators generally perceived as important determinants of the degree of income inequality within countries. The empirical specifications in these studies do not stem from any systematic theorisation as in case of the studies based on the Bouguignon-Morrisson framework. Edwards (1997) and Savvides (1998a) are the two papers that fall in this category. We discuss each of these in turn.

The Bourguignon-Morrisson Framework The basic idea that the personal distribution of income within an economy is dependent upon the pattern of ownership of factors of production, the economy's endowments of various factors of production and upon the structure of trade protection, can be expressed formally following Bourguignon and Morrisson (1990) (BM for short).

The structure of the BM model is as follows : there are n individuals, m factors and p sectors of production in the economy. Each sector is represented by a production function, $F_k = F(L_1, L_2, \ldots\ldots, L_m)$, where the production functions are assumed to exhibit constant returns to scale. There is perfect competition in the product and factor markets and it is assumed that factor markets clear, i.e. all factors of production are fully employed. Factor returns $(w_1, w_2, \ldots., w_m)$ are determined by the values of the marginal product of the factors in each sector. Trade is introduced in this framework via the structure of goods' prices. It is assumed that the economy is a small, open one where all goods' prices are given exogenously (assuming there are no non-traded goods). In this case the structure of trade is determined by domestic demand. Net exports for each good is the total production less domestic consumption of that good. From here BM argue that what is important from the point of view of the impact of international trade, on the distribution of income is not the 'structure of trade' itself (i.e. what goods are exported and what are imported), but the 'structure of protection'. The latter is important as it determines the prices of traded goods in the domestic market and this is important for determining the returns to factors of production and through this the distribution of income. Essentially within this framework, international trade affects the distribution of

income via a change in goods' prices. Allowing for the possibility of non-traded goods, BM recognise that domestic demand patterns also play a role in determining goods prices in this case.

The distribution of income in this context is simply the vector Y of the total income earned by each individual in the economy, i.e. $Y = (y_1 , y_2 , y_3 , ..., y_n)$. The ith individual's income, y_i is a weighted average of his income from the ownership of some subset of the m factors. The weights (a_{ij} / E_j), represent the share of the jth factor owned by individual i, as a proportion of the total endowment of factor j, E_j. Individuals' ownership of the existing factors of production explains the personal distribution of income in such an economy. Within such a setup BM show that the distribution of personal incomes is dependent upon, (a) endowments of factors of production in the economy, (b) prices of goods, (c) the structure of trade protection and (c) the structure of factor ownership. In their empirical work, BM assume that all small open economies face the same set of international prices and in this way avoid including the price term as a determinant of cross-country differences in income distribution.

Spilimbergo et al. (1999) extend the BM framework. Treating the world as an integrated economic unit, they show that international prices are determined by world factor endowments, in the same way as goods prices are determined by factor endowments in a closed economy. Since international prices determine factor prices within an open economy, they show that in an open economy factor prices and hence the distribution of income is determined by (a) internal endowments of factors of production, (b) world endowments of factors of production, (c) the structure of trade protection and (d) the structure of factor ownership. This extension allows Spilimbergo et al. to do away with the price term and express income distribution as a function of factor endowments.

Empirical Studies based on the BM Framework The basic design of the empirical studies that examine the relation between international trade and personal income distributions is as follows : these are mainly econometric analyses that aim to explain the variation in the personal distribution of income on the basis of cross-country panel

datasets and the explanatory variables are drawn chiefly from the BM framework. The dependent variable in each case is a measure of income inequality and both Spilimbergo et al. (1997) and Savvides (1998b) use the inequality measures from the Deininger-Squire (1996a) data set. The explanatory variables are measures of factor endowments, proxy measures for the ownership and distribution of factors of production across the population and measures of trade openness.

Where the studies differ from each other is in the factors of production that they identify as being the primary ones whose endowment and distribution explain personal income distributions and also in the measures of trade protection that are used. For instance in the BM study, unskilled labour, skilled labour, capital, export-specific land, non-export-specific land and mineral resources are the main factors of production considered. BM carry out a cross-section analysis for the year 1970, using data on small and medium developing countries. Their empirical result with respect to openness is that greater trade protection tends to worsen the income shares of the bottom 40 and 60% of the population.

Both Spilimbergo et al. (1997) and Savvides (1998b) use cross-country panel data in their econometric analyses. The two studies consider different measures of trade openness and the endowments of factors that they include as regressors are also different. In the study by Spilimbergo et al., the factors of production considered are arable land, capital, skilled and unskilled labour force[12]. They estimate the following equation :

$$Gini_{it} = \alpha + \beta.A_{lit} + \delta.A_{kit} + \gamma.A_{sit} + \eta.O_{pit} + \lambda.A_{l}.O_{pit} + \mu.A_{k}.O_{pit} + \nu.A_{s}.O_{pit} + \theta.gdppc_{it} + \varphi.(gdppc)^{2}_{it} + \varepsilon_{it},$$

where, A_l = arable land per capita ; A_k = capital per worker ; A_s = endowment of skilled labour (skill intensity); O_p = measure of trade openness; and gdppc = GDP per capita.

[12] For each factor of production Spilimbergo et al. construct a measure of relative scarcity in the following way : Af_{it}= ln (E_{fit}/E_{fit}*), where E_{fit} = per capita endowment of factor f in country i in year t and E_{fit}*= world per capita effective endowment of factor f at time t, which is computed by weighting every country's

This study uses seven alternate measures of trade openness[13] and their basic result regarding income distribution and openness is fairly robust to the choice of indices. The basic result obtained with respect to openness is that inequality *increases* in countries that are well endowed with skills when the economy opens (this result is in line with the empirical literature on wage inequality that finds trade openness increases the premium for skilled workers). While inequality *decreases* in countries that are relatively well endowed with capital when the economy opens (this result is interpreted as being in line with the rent-seeking literature (e.g. Krueger, 1974) that argues that rents from the ownership of capital decreases when the economy opens up). For a subsample of developing economies the coefficient of O_p is insignificant while the coefficients of the interaction terms λ, μ, ν are significant. This indicates that trade openness per se has no effect on the distribution of income in developing economies, apart from the effect on factor prices, which works out via factor endowments (this result is in line with Edwards, 1997 discussed below).

Savvides (1998b) considers endowments of educated labour force, natural resources and physical capital. This paper uses two alternate measures of trade protection and its empirical results are in line with the findings of Spilimbergo et al., viz. that the impact of trade openness upon income distribution will differ, depending upon the economy's endowment of skilled labour.

Other Empirical Studies on Trade and Personal Income Distribution Another class of empirical studies simply test the effect of trade protection on the distribution of income without bringing in factor endowments specifically into the picture (Savvides, 1998a, Edwards, 1997). Both studies use alternate measures of trade protection and income distribution data from the Deininger-Squire data set. In Edwards (1997) the dependent variable is change in the Gini coefficient over time and this is regressed on an openness indicator, the initial level of GDP, the rate of growth, the rate of inflation, and

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endowment by its population and degree of openness (this is used as a weight to account for the fact that the endowments of close economies do not compete in the world markets with other factors).

[13] Spilimbergo et al. develop a new endowment-corrected measure of trade openness and use six existing indices of trade openness.

change in the proportion of population with at least secondary schooling. Edwards focuses only on developing countries and finds no evidence linking openness or trade liberalisation to increases in inequality. Savvides (1998a) carries out a similar empirical exercise. He regresses change in the Gini coefficient on a measure of openness, the rate of growth, secondary schooling rate and includes a developing country dummy. He finds that trade liberalisation tends to increase income inequality in developing countries, but has no such effect for developed countries.

2.2 A Critique of the Literature on Trade and Personal Income Distributions in Analysing the Problems of a Developing Economy

A common empirical approach is adopted in each of the studies that explore the relation between international trade and the personal distribution of income. Each of the authors estimates a multiple regression equation with some measure of income distribution as the dependent variable and a measure of trade openness as one of the independent variables. The studies differ, both with respect to the 'other' independent variables included in the regression (i.e. other than trade openness) and the exact measure of trade openness used. While this approach indicates the sign and strength (or weakness) of the relation between trade and distribution[14], it certainly does not throw any light on the specific channel(s) via which trade affects income distribution. This is an important respect in which our approach differs from that in this literature. For we do not estimate a multiple regression equation as in the studies reviewed above. Essentially we attempt to analyse the nature of a specific channel via which international trade may affect the distribution of income, viz., the process of structural change. As such, we first analyse the relation between structural change and income distribution and then examine the relation between trade and structural change, to see how greater openness to international trade may affect distribution through this route.

[14] This would be indicated by the sign and statistical significance of the coefficient of the openness variable in the regression.

Specifically two classes of studies on trade and personal income distribution have been discussed above. The second set of studies (Savvides, Edwards etc.) suffers from the drawback that their choice of determinants of income inequality is somewhat arbitrary and not directly derived from a systematic theoretical framework. The first set of studies does not have this problem. However we would like to specifically focus on the distribution of income within developing countries and the BM and Spilimbergo et al. frameworks are not directly suitable for this purpose.

In particular, we show that the BM framework if we accept it as it is, is not suitable for analysing the problems of a developing economy with surplus labour. Next we discuss, given that unemployment (and underemployment) is a stark reality in developing economies, it is important to incorporate this as a feature in models that explore the determinants of income inequality in the context of such poor countries. However, taking unemployment explicitly into account would lead to a breakdown of the basic premise in the BM framework, viz. that individuals' endowments explain their levels of income.

A Critique of the BM Framework The main result derived within the BM framework regarding the determinants of the personal distribution of income within the economy, holds under a special set of assumptions, viz. perfect competition in goods and factor markets, full employment of all factors of production, fixed endowment of assets, small open economy and so on. This theoretical framework can be criticised for its assumptions (especially perfect competition and full employment), as these assumptions are blatantly unrealistic in the context of underdeveloped countries - this point has been made several times, particularly by the 'structuralist' macroeconomists (see e.g., Patnaik, 1996; Rakshit, 1982; Taylor, 1983, 1991 etc.). In a typical developing country, the bulk of the population lives in abject poverty. As a result the domestic market for many commodities, especially consumption goods, is limited due to the low income levels of the consumers. Often, this is the reason why these countries have a poor industrial base. Low demand for goods make for a small market size, which is an important reason why many poor countries tend to have a under-developed industrial base. In turn, this weakens

the linkage effects of industrialisation - low demand for goods spills over into factor markets and makes for a low demand for various factors of production. As such resources are unemployed, as in most cases, supply tends to exceed the low levels of demand. Under perfect free market conditions the price of such resources would be bid down till the price is low enough to ensure that supply matches demand and there is full employment of all resources. However in reality markets are imperfect – there are externalities and particularly informational asymmetries that prevent the attainment of full employment in reality. Also there is a natural floor below which the rate of return to factors of production cannot fall (the subsistence wage, in case of labour) – in reality this also keeps factor returns from being bid downwards continuously until full employment is attained.

We would like to stress here that in particular, the assumption of 'full employment' can be problematic in trying to apply the BM framework to analyse the problems of developing economies. First we show that if we allow for the existence of unemployment or 'surplus labour', the BM model will not always predict correctly the effect of trade liberalisation upon the distribution of income (point (A) below). Next we argue that incorporating the effects of unemployment into the BM framework would affect one of its basic premises, viz. that individuals' endowments of various assets determine their income levels (point (B) below). Finally we point out that contrary to the result obtained in the BM model, there is reason to expect that, not only the structure of protection, but the structure of trade would also affect the overall distribution of income within an economy (point (C) below).

(A) In the BM framework relative prices of goods are the main channel via which international trade affects factor incomes. However the income distribution effects of a change in the trade regime are worked out in this model based on the assumption of full employment of factors of production. Typically developing economies are characterised by structural rigidities (e.g. infrastructural constraints that may keep resources from moving to areas where the highest returns are to be earned), high rates of population growth and low rates of economic growth (or employment creation), which give rise to

tremendous problems of unemployment and underemployment among the working-age population. We argue that in the presence of unemployment or structural rigidities, the effects of trade on factor incomes cannot always be correctly predicted within the framework of the BM model. For example, following a rise in the demand for the exportable good, the factor used relatively intensively in the export industry will always gain in this model as its price will have to rise to ensure that the factor is competed away from its alternative use and attracted towards the export industry. However, if the factor in question is surplus labour in the context of a developing economy, an increase in supply may be forthcoming at the given wage rate and in this case relative wages would not change at all. In this case the actual effect of international trade on the distribution of income would differ from that predicted by the BM model. A specific example would clarify this point further.

Consider a developing economy with surplus labour in its agricultural sector. We assume the country has a natural comparative advantage in agricultural production, but adopts an inward-oriented strategy of development based on industrialisation. In order to protect domestic industry from foreign competition, tariffs are imposed on imports of industrial products. As a result domestic relative prices of industrial goods vis a vis agricultural goods are higher than would prevail under free trade. Now after a period this country adopts trade liberalisation policies involving a reduction of tariff barriers. In the pre-liberalisation phase, owing to the higher relative prices in the industrial sector, resources tended to be allocated more in 'favour' of this sector as relative profitability in the sector was higher than within agriculture. Following the reduction in tariffs however, relative agricultural prices rise, raising relative agricultural profitability. As a result resources now tend to move towards this sector resulting in an expansion of agricultural output, employment and perhaps even labour productivity. Since the agricultural sector has surplus labour the expansion of output will come about at unchanged wages.

Consider the effects of this liberalisation measure upon the overall distribution of income, within the BM framework. Within the BM framework, resources are assumed to be fully employed and there is no existence of a labour 'surplus' as such. As a result the return to

a factor would always rise as a result of an increase in demand for it. That is, in our example, following trade liberalisation the wage of agricultural labour would increase within the BM framework. Given this is the abundant factor, this would result in a reduction in overall inequality, assuming that the structure of ownership of factors remains unchanged. Therefore in this case, the BM framework does not allow for the possibility of overall income inequality to increase following trade liberalisation. We argue that in our example, following trade liberalisation, overall inequality might actually increase in the case where agriculture is characterised by surplus labour. With surplus labour in agriculture, following the rise in relative prices of agricultural goods, agricultural output and employment can be expanded at an unchanged wage rate. As long as this increases the share of profits in total output, inequality within the agricultural sector would tend to go up, as we assume that profit earners constitute a small group as compared to wage earners in this sector[15]. Using an additive decomposition of the Gini index of inequality into an 'intra sector' and an 'inter sector' component by Anand and Kanbur (1993a)[16], we can argue that with the rise in the inequality within the agricultural sector, *ceteris paribus,* overall inequality in the economy would also tend to increase (here we assume that if, agricultural per capita incomes rise following the rise in agricultural prices, this would not reduce between-sector inequality in a significant manner).

(B) Within the framework developed by BM, an individual's income depends upon (a) his endowment of various assets, (b) his income from labour, (c) prices of goods and on (d) government policy instruments such as tariffs that create a wedge between the equilibrium price that would prevail under free market conditions and the actual market price. In simple terms, according to this view, *ceteris paribus,* an individual's income is determined by his ownership of various assets (or factors of production) and the owner of a relatively scarce asset will earn more than the owner of an asset that is in relatively

[15] The structure of ownership of agricultural land in developing countries (where land redistribution or land reform policies have not been undertaken) tends to be characterised by extreme inequity. This inequity in ownership in turn results in an extremely unequal division of the revenue earned from land. Given that landowners are few and that the number of landless dependent on them for employment are many, this tends to weaken the latters' bargaining power and the division of the value-added generated by the agricultural sector, is biased overwhelmingly in favour of the former.

abundant supply. However we argue that in developing economies which typically have vast reserves of unemployed resources, particularly labour, this need not always be so. In the presence of unemployed resources, information about an individual's endowment of an asset is not always sufficient to indicate his level of income; as such, results based on this kind of a framework are unlikely to provide any concrete basis for policy formulations. A simple example illustrates this point in the context of less developed economies with unemployed resources.

Consider an individual's endowment of education. Typically education is a scarce resource in a developing country where even today the bulk of the population remains poor and illiterate (or poorly educated). In the Bourguignon-Morrisson framework therefore, in poor countries those with some education should earn far higher incomes than those without any education. While this is true in general (i.e. an educated individual with a job will in general earn more than an uneducated individual who is also employed), consider also the following problem. There is unemployment among both the educated and the uneducated population. Thus an unemployed, uneducated person earns exactly the same income as an unemployed educated person, viz. zero[17]. In this case obviously a person's endowment of education does not help to determine his earning. Such examples abound, e.g. an uneducated person with a job often earns more than the educated unemployed. In this case too, individual endowment of education does not help explain income differentials across individuals. Several other issues can also be brought in, to highlight the weakness of this endowment based approach for explaining personal income distributions. To cite one, for instance, in many cases the ownership of a particular *type* of asset, rather than the *quantity* of the asset owned can explain income differentials across individuals. An example will help illustrate this point. A small plot of land in the downtown area of a city will often earn the owner a much higher rental income than, even a huge plot of land in a relatively unfashionable or unsafe area in the same city. Further in developing economies, which typically have mixed economies with a sizeable presence of the government in most spheres of economic life, there are many

[16] This Gini decomposition is discussed at length in Chapter 3.

[17] In fact this is true even in developed countries where the unemployed population all earn the same amount in 'dole' irrespective of their levels of education.

instances of those with official connections cornering large amounts in rents[18]. We mention this to highlight another instance of individual incomes being explained by factors other than endowments of resources. So far we discussed a number of shortcomings of this approach; however we'd like to point out that it has its merits too, especially when used for explaining income differentials within a class of individuals who own (different quantities of) the same asset[19].

(C) Within the BM framework neither the volume nor the structure of foreign trade affect the distribution of income within an economy. This is because of the theoretical structure of the model where trade volumes are determined *endogenously*, as the difference between total production (determined by relative prices and factor endowments) and total domestic consumption (determined by prevailing tastes and preferences). We point out, first, that the structure of trade may be influenced by exogenous factors as well and second, that changes in the structure and volume of foreign trade may also influence the structure of production and employment and therefore the overall distribution of income within the economy.

To begin with, in a real world situation, exogenous factors other than domestic taste and preferences can also determine the structure of trade. For instance, trade patterns may be historically given, especially in the context of countries that were former colonies. Trade patterns in such countries were once geared to serve the interests of the colonisers and the colonising country. This historical reality tends to influence the pattern of trade in these countries in the post-colonial era as well. Also, often, political factors affect the composition of the trade basket. For instance, often countries enter into strategic trade agreements in order to strengthen political ties. Thus in reality the pattern of trade may be given exogenously, or it may be determined by extra-economic factors.

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[18] In this connection see the relatively old literature on rent seeking, attributable largely to Kreuger (1974).

[19] For instance, if one were explaining income differentials among the population of educated people in the country (say those with at least secondary level education), then one might rationally expect that differential endowments of education would help explain earning differentials across individuals, to a large extent. That is, controlling for other factors that also determine earnings (e.g., age of an individual) we could expect those with higher education levels to earn more than those with lower levels of education.

The other point we try to make is that the sectoral composition of aggregate output and employment has an important bearing on the nature of the distribution of overall incomes within the economy. Insofar as the structure of international trade affects the composition of output and employment, it would also tend to affect the distribution of income. For instance, the sectoral output structure of a primary-exporting economy is likely to be distinctly different from that of a manufactures-exporting one. As such the sectoral employment structure would also be quite different for these two types of economies and in this dissertation we go on to argue that the implication of trade liberalisation would be different in each case. Also when there is a change in trade volumes, we argue, the concomitant changes in output and employment would tend to release forces that would affect the overall distribution of income in the economy.

3 Conclusion

Having critically reviewed the existing literature on international trade and personal income distributions, we now present the broad structure of our approach towards analysing this issue. Our main arguments can be summarised as follows. Our objective is to study the nature of a particular transmission mechanism linking trade openness and the personal distribution of income. The particular mechanism we study is the process of industrial transformation of a developing economy. The reason we choose this particular mechanism is because it appears to be an important factor affecting the personal distribution of income within an economy (see Kuznets, 1955; 1963). We also pointed out that within the HOS framework structural change is an important way in which trade affects economic outcomes. This highlights the importance of this variable even in standard trade-theoretic framework. However, HOS theory relates trade and *functional* (and not *personal*) income distributions. This is one of the reasons why we do not use the HOS framework directly for our analysis[20].

[20] However we do note that the distributional effects predicted by HOS theory may have some relevance in the context of labour abundant developing countries.

We begin from Kuznets (1955) which, till today remains the single most important reference point for any research work on personal income distributions. From Kuznets's explanation for the inverted-U shaped relation between income inequality and per-capita incomes, there emerge certain clear-cut implications regarding the relation between structural transformation and the pattern of income distribution within an economy. We set up an analytical framework for studying this relation in the context of a typical developing economy, which draws on the dualistic economy model developed in Lewis (1954). Having analysed the relation between structural change and income distribution, we then turn to the relation between international trade and structural transformation. We examine how international trade affects the inter-sectoral composition of aggregate output and employment in the economy. In particular we attempt to analyse how the structure of output and employment is likely to be affected as countries engage in a greater volume of trade with the rest of the world. This completes our chain of reasoning : we first examined how structural transformation affects the distribution of income within an economy, next we saw how greater trade openness is likely to affect the process of structural transformation and therefore the overall distribution of income within an economy.

Chapter 3

Structural Change and Income Inequality in Developing Economies

Introduction In this chapter we address the broad question, how does the process of industrial transformation affect the personal distribution of income within a developing economy ? As in any research work on personal income distributions, the starting point of our analysis is also Kuznets (1955). What clearly emerges from Kuznets's writings is that under certain circumstances, the process of industrialisation would have very clear-cut implications for changes in the distribution of income within the economy. In the first part of this chapter we present our basic arguments regarding the relation between the process of structural change and the overall (personal) distribution of income within a developing economy. Thereafter we examine the evidence from a group of eighteen developing countries from Asia and Latin America as we try to ascertain the nature of empirical support for our hypothesis regarding the relation between structural change and income inequality. An important point that emerges from our analysis is that the existence of an informal sector plays an important role in determining how inter-sectoral labour movements affect the overall distribution of income in the context of developing economies.

In what follows we first discuss the theoretical underpinnings of the argument that change in the structure of output of an economy has particular implications for changes in the personal distribution of income (Section 1). In this context we first examine the main arguments presented in Kuznets (1955) regarding the factors affecting the personal distribution of income (Section 1.1). Next we review briefly the literature that examines the Kuznets Curve relation; in particular we discuss the main issues focussed on in this literature and the main conclusions that emerge from it (Section 1.2). We also show that even though the relation between structural change and income inequality has been formally analysed in the existing literature, yet this has received relatively little attention in empirical analyses (Section 1.3). Next we turn to data on a group of developing countries as we try to ascertain whether there is empirical support for the hypothesis that

the process of structural change experienced by a country has important implications for the overall distribution of income within the economy (Section 2). First we analyse the empirical evidence on structural change and changes in the distribution of income for a group of eighteen developing countries (Section 2.1). Next we carry out an econometric analysis to gain further insight into the process of structural change and change in income distribution (Section 2.1). We end the chapter with a discussion on the main conclusions that emerge from our study (Section 3).

1 Structural Change and Income Distribution

1.1 The Kuznets Curve, Structural Change and Income Distribution There is an old literature which points out that as countries develop, it is expected there will be a change in the inter-sectoral composition of output, with a rise in the shares of industry and service and a fall in the share of agriculture in total output (see Johnston, 1970 for a survey of these issues). The literature on the Kuznets curve indicates that this change in the structure of production has particular implications for changes in income inequality within the economy.

The Kuznets Curve Kuznets (1955, 1963) recorded an inverted U-shaped relation between per-capita income and a measure of income inequality (the ratio of the share of income accruing to the richest 20% of the population, to the poorest 40%) on the basis of data on a set of developed and developing nations. This empirical inequality–development relation is widely referred to in the literature as the Kuznets Curve.

Kuznets observed that relative income shares of the richest and poorest population quintiles exhibited a tendency to move towards equality for developed countries like the UK, Germany and the USA[1] in the first half of the twentieth century. He speculated that

[1] " In the United States, ... the shares of the two lowest quintiles rise from 13 1/2 per cent in 1929 to 18 per cent in the years after the second world war ....; whereas the share of the top quintile declines from 55 to 44 per cent and that of the top 5 per cent from 31 to 20 per cent. In the United Kingdom, the share of the top 5 per cent of units declines from 46 per cent in 1889 to 43 per cent in 1910 or 1913, ... and to 24 per cent in 1947; the share of the lower 85 per cent remains fairly constant between 1880 and 1913, between 41 and 43 per cent , but then rises to .... 55 per cent in 1947." [Kuznets (1955), page 4]

income inequality in these countries had widened previously during the nineteenth century. These were industrialised countries that experienced prolonged periods of high growth and attained high per capita income levels by the post war years and this process of rising per capita incomes was accompanied by a relative narrowing of the income gap between the richest and the poorest income groups in the country. As for the developing countries of Asia, Africa and Latin America, these were largely agriculture-based, stagnant economies characterised by low per capita income levels. However, income inequality tended to be higher in these developing nations than in the developed Western countries[2]. From here the following three observations, led to the formulation of a possible inequality-development relation : (a) income inequality tends to be high in developing countries with low per capita income levels; (b) income inequality was relatively higher (as compared to their current levels) in developed countries, when their per capita income levels were lower; and (c) currently income inequality in high per-capita income developed countries is lower, both as compared to their own past levels and to the levels of inequality in the developing countries. This led Kuznets to conjecture that, there is possibly a relation between countries' per capita income levels and the extent of inequality in their overall distribution of income and that, there is a turning point in this relation. That is, at relatively low levels of per capita incomes, there is a tendency for income inequality to increase as per capita income increases; thereafter, at relatively higher per capita income levels, there is a tendency for the extent of income inequality to actually narrow as per capita income increases. This reasoning forms the basis of the 'Kuznets Curve' or the inverted-U shaped relation between per capita income levels and the extent of inequality in the overall distribution of income.

There are essentially two dimensions of the inequality-development relation observed by Kuznets – one relates to the difference in levels of inequality between developed and developing nations, whereas the second refers to the change in inequality over time

[2] "...compare the distributions for India and the United States. ...the second quintile in India receives only 9 per cent (of total income), the third 11, and the fourth 16; whereas in the United States, the shares of these quintiles are 12, 16, and 22 respectively." "The shares of the top quintile are 55 per cent in India, ... compared with 44 per cent in the United States ..." [Kuznets , *op cit.*, pages 22 and 21 respectively] . The figures for India refer to 1950. For the USA, these are average figures for the post-war years of 1944, 1946, 1947 and 1950.

within a nation. Even though his empirical research was constrained by an acute shortage of reliable data, yet on the basis of his observations on broad economic parameters, Kuznets attempted to explain both these dimensions. We primarily concentrate on the explanation for the change in income inequality within a nation as, to our mind, it offers an important insight into the nature of the determinants of the overall distribution of income within an economy, that have largely been ignored by most economists who analysed this issue at a later date.

Factors Affecting Personal Income Distribution in an Economy From the analysis in Kuznets (1955) it appears that several factors have a bearing upon changes in income distribution within an economy. He discusses factors that tend to make the distribution more unequal as well as factors that counter this tendency and move it towards greater equality. Here we will briefly touch upon some of the factors which, according to Kuznets were important determinants of the distribution of income within an economy. In this dissertation however, we are primarily interested in the process of structural change, which emerges from in the writings of Kuznets as an extremely important factor shaping the overall distribution of income within an economy.

Regarding the factors that tend to make the distribution more unequal, these are (a) the concentration of savings within the upper income classes and (b) the process of industrial transformation of an economy. The latter point is elaborated at length in the following subsection and in the rest of this chapter. Regarding the former issue, Kuznets pointed out that the higher income groups tend to be the main savers in the economy. In fact for the US he noted "... the total savings of groups below the top decile are fairly close to zero." [Kuznets (1955), pp.7]. Such inequality in savings behaviour tended to enhance income inequality by leading to the concentration of an *increasing* proportion of income-yielding assets in the hands of the upper income groups.

As for factors counteracting the increasing concentration of income, Kuznets discusses primarily four sets of factors that affected income shares of different groups within the economy and therefore affected income inequality in the long run. These include,

demographic factors like the fact that family planning practices tend to be more prevalent among the upper income groups. This is one reason why population growth among these classes is distinctly slower than among the poorer income groups. As such the cumulative effects of concentration of savings tend to be much weaker than they would have been if the top 5% of a given year had, through their descendents, filled completely the ranks of the top 5% of the population of, say 50 years afterwards. This is how, according to Kuznets, demographic factors tend to counter the impact of concentration of savings.

The second set of factors relates to the dynamics of competition in an economic environment where market forces operate freely. In such a setting, new technologies and newer industries emerge even as old ones decay; new fortunes are made and established ones are lost. In general the operation of these forces ensure that the composition of the upper income groups keeps changing. Therefore a fortune, once made, does not remain in the same family for generations at a stretch. Also in such dynamic economies as new fortunes are made, many rags to riches stories come true. This character of a dynamic market economy is yet another factor that tends to counter the cumulative effects of the concentration of savings.

The third set of factors pertains primarily to developed economies where industrial transformation had already occurred. At this stage of development the service sector became extremely important, even as service incomes accounted for a significant component of total incomes of even the upper income groups. According to Kuznets this feature of the mature, industrialised economies would, over time, create a tendency for a narrowing of the income gap between the top and bottom income classes due to the following reasons : (i) service incomes of the upper income groups are quite high to begin with. As such the scope for further growth of such incomes is limited, compared to the incomes of the lower income classes, which are much more likely to show an upward trend. Hence according to Kuznets, there is much less possibility of keeping service incomes at the top at continued high *relative* levels ; and (ii) an important factor underlying the rising trend in per capita incomes is the inter-industry mobility of labour, particularly the movement of labour from low-income to high-income activities.

However the possibility of such "income-enhancing" occupational shifts is far more limited for the upper income groups, who are already in high-income occupations, and "... the range for them toward higher paid occupations is more narrowly circumscribed" [Kuznets (1955), pp.11]. This factor, viz., greater upward mobility of incomes of the lower income classes and limited upward mobility of top level (service) incomes is another factor that contributes to the tendency for the overall distribution of income to move towards greater equality.

Finally, Kuznets discusses the role of political decisions closely linked with the emergence of a Welfare State. Policies of progressive taxation and other taxes aimed at limiting the concentration of property incomes (e.g. inheritance taxes and other explicit capital taxes) tend to counteract the effects of concentration of savings in the upper income classes. On the other hand, transfer payments tend to supplement incomes of the relatively poorer sections of society especially in the context of developed nations. Together these two sets of factors contribute to a narrowing of the income gap between the upper lower income classes and thereby move the overall distribution towards greater equality.

Structural Change and the Distribution of Income Kuznets' understanding of the determinants of the overall distribution of income within an economy links closely with the structural transformation experience of developed Western countries like the UK, USA and Germany. These countries underwent a transition from predominantly agrarian to the industrial societies of today. There is a large literature (see for instance, Clark (1957) and Kuznets (1966)) that seeks to explain this particular pattern of structural transformation as a concomitant of economic growth and development. As countries grow faster and higher levels of per capita income are attained, the demand for non-agricultural products starts increasing. Demand for agricultural products, especially food items, is inelastic. As incomes rise, people tend to spend a smaller proportion of their total incomes on food. The changing pattern of demand with rising incomes is seen as one factor from the demand side that is responsible for the structural transformation of agrarian economies into industrial ones. With sustained rise in incomes, typically, the

demand for services also tends to grow, which explains the growth of the service sector with economic growth.

According to Kuznets the process of structural transformation of an economy has important and fairly clear-cut implications regarding changes in overall income distribution. He argues that in the initial stages of the transition from an agricultural to an industrial society there is a trend towards greater inequality in the overall distribution of income. This follows from certain assumptions regarding the inter-sectoral and intra-sectoral income distributions. Kuznets assumes that that per capita income in the industrial sector is higher than in agriculture and that income inequality is higher within the industrial sector[3]. There is indirect evidence which suggests in general this is true for most developing countries. Given that urbanisation is a natural concomitant of industrialisation, urban inequalities can be regarded as a rough approximation of inequality within the industrial sector. The data in Table 1A[4] shows that with few exceptions, urban inequality tends to be higher than rural inequality (as measured by Gini coefficients) for most countries and at most points of time. Therefore, as the relative share of the industrial sector in output and employment rises, inequality tends to increase for two reasons :

(a) the population weight of the sector with higher *intra-sectoral* inequality goes up ; and (b) with economic growth, industrial productivity rises relatively faster (than agricultural productivity) and the per-capita income differential between the industrial and agricultural sectors widens. This leads to a widening of *inter-sectoral* income inequality, thereby reinforcing the tendency for economy-wide income inequality to increase.

For developing countries, the *process* of structural transformation can be understood most clearly in terms of the Lewisian class of dual economy models. Lewis (1954) observed

[3] Kuznets (1955, p.12) constructs a numerical example to illustrate the relation between change in sectoral employment shares and income inequality, where he assumes that " ... the per capita income of sector B (non-agricultural) is always higher than that of sector A; that the proportion of sector A in the total number declines; and that the inequality of the income distribution within sector A may be as wide as that within sector B but not wider."

[4] See Appendix Tables at the end of this chapter (Pages, 86-87).

that overpopulated underdeveloped countries are typically characterised by a dualistic economic structure – a small (in terms of shares in both total output and employment) manufacturing sector and a large agricultural sector[5]. The agricultural sector has *surplus* labor in the sense that the marginal productivity of labour is virtually zero. This sector is characterised by low productivity, low per capita incomes and a low level of savings. In fact production is organised along traditional lines within this sector and the counterpart of an entrepreneurial class that invests its profits in a productivity-enhancing manner, as in the modern industrial sector, is largely missing. For economic growth in the Lewisian world, there must be a transfer of resources from agriculture to industry, as capitalists in the industrial sector are the main savers in the economy who invest all (or a high proportion of) their profits.

Essentially the central idea in the Lewis model is that the accumulation of savings is the most important prerequisite for growth and development. The capitalists in the industrial sector are seen as the primary saving and investing class in the economy. As such, the prescription for growth for developing countries that emerges from the Lewis model is that the industrial sector (or the 'modern' sector in Lewis, 1954) must be the 'leading' sector in some sense, for as this sector expands and absorbs the bulk of the labour force, the economy will move on to a higher growth path. Most developing countries have in fact followed this path and embarked on programs of industrialisation. Where many (mainly large) countries embarked on such programs based essentially on the domestic market, relatively smaller countries concentrated on competing for a share of the world market. As such, some countries adopted ISI (Import Substituting Industrialisation) policies and protected home markets from foreign competition, in order to encourage the

[5] Lewis (1954) discusses dualistic economic structure in terms of a traditional sector and a modern sector. The main distinction between the two sectors is that the organization of production in the latter follows the marginal product rule (where at the equilibrium employment level each factor is paid the value of its marginal product); whereas in the traditional sector (where family labour is predominantly used) factor remuneration is not necessarily based on such criteria and the total product is divided among family members (or among participating units) according to some informal product-sharing agreement. In general, in the Lewis model it is assumed that workers receive their average products in the traditional sector.

growth of a domestic industry. Others actively adopted export-promotion strategies and attempted to develop an industrial base geared to produce mainly for an export market[6]. From the Kuznets Curve relation it appears that the process of structural transformation of an agrarian economy, analysed by Lewis, has certain fairly clear-cut implications regarding the nature of change in the pattern of income distribution within a country[7]. In what follows we examine the actual change in income distribution patterns of some developing countries in order to see to what extent this can be explained by their experience regarding structural change, in line with the Kuznets curve theory. But first we briefly review the large body of literature that focuses on the Kuznets Curve relation – in particular we examine how the relation between structural change and income inequality is analysed in this literature.

1.2 The Literature on the Kuznets Curve There is a large body of mainly empirical literature that focuses on the Kuznets curve. In what follows we discuss the basic issues that this literature addresses and the main conclusions that emerge from it.

What the Studies Focus on There is a vast literature that attempts to establish and explain the existence of the Kuznets Curve on the basis of data on developed and developing countries (a selection of these studies include Ahluwalia, 1976; Anand and Kanbur, 1993a, b; Bourguignon and Morrisson, 1990; Chenery et al., 1975; Deininger and Squire, 1996c; Jha, 1995; Ogwang, 1994; Papanek and Kyn, 1986; Paukert, 1973; Sundrum, 1990; and Ram, 1995)[8]. The most common empirical test for the existence of the Kuznets curve involves running a cross-country regression with some measure of income inequality as the dependent variable and with per-capita GDP (an index of development) and the square of per-capita GDP as independent variables. That is,

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[6] Countries adopting export-based growth strategies were often compelled to do so, as otherwise growth would be constrained by the smallness of their internal market sizes.

[7] For related discussions on how income distribution is affected by the process of development in general, and by economic growth in particular, see for instance, Adelman et al. (1973), Chenery et al. (1974 & 1975), Fei et al. (1979), Fields (1980), Taylor (1991) and so on. Adelman et al. (1989) and Lipton and Ravallion (1995) are excellent surveys of these issues and provide extensive references to this literature.

[8] See Bruno et al. (1998) and Kanbur (2000), for recent surveys of this literature.

typically these studies regress a measure of income inequality (e.g., the Gini coefficent) on per capita income and its square and estimate an equation of the form[9],

$$g = \alpha + \beta.y + \gamma.y^2 + \varepsilon,$$

where, g = Gini coefficient (or some other measure of income inequality, such as the ratio of the cumulative income share of the richest 20% to the poorest 40% of the population); y= per capita income; and ε=random error term.
A positive (and statistically significant) coefficient for 'y' (i.e., $\beta > 0$) and a negative (and statistically significant) coefficient for 'y^2' (i.e., $\gamma < 0$), is taken as confirmation of an inverted U-shaped relation between income inequality and per-capita incomes.

These studies differ mainly with respect to the functional form used to test the Kuznets curve relation, the measure of inequality used, the countries included in the data set and the determinants of inequality (other than per capita income) considered. For example, Ahluwalia (1976) uses the share of income of various population percentiles as a measure of inequality and the logarithm of per capita income and its square as the relevant functional form. Chenery and Syrquin (1975) and Bourguignon and Morrisson (1990) use the same inequality measures, and per capita income and its square as the functional form. Papanek and Kyn (1996) and Sundrum (1990) use both the Gini coefficient and the income share of the poorest 40% as inequality measures and the Ahluwalia functional form. Ram (1995) measures inequality with both the Gini and Theil index and employs both the Ahluwalia, and Bourguignon and Morrisson functional forms. Anand and Kanbur (1993b) adopt an alternate form to estimate the inverted-U relation, consisting of per capita income and its inverse and Deininger and Squire (1996c) also use this. While Ogwang (1994) develops a functional form based on a framework of nonparametric regression, where the relation between inequality and per capita incomes is estimated using the kernel method.

[9] The exact form of the equation can vary, as a number of studies following Anand and Kanbur (1993b) test the existence of the Kuznets curve relation by regressing income inequality on per capita income and its

Regarding the data used in these empirical studies, the datasets compiled by Paukert (1973), Jain (1975), and later Fields (1989a, b) have been widely used in empirical studies of the Kuznets curve relation. However, earlier due to the lack of a sufficiently long time series on inequality measures, most empirical studies were based on cross-section data. For instance, Paukert (1973), Chenery et al. (1975), Ahluwalia, (1976) and Bourguignon and Morrisson (1990) all test for the existence of a Kuznets curve relation on the basis of cross section data. More recently since the compilation of the Deininger Squire (1996a) data set, authors have used panel data to investigate the existence of the Kuznets curve (see eg., Bruno et al., 1998; Deininger and Squire, 1996c; and Li et al., 1998).

As for the theoretical framework underlying the empirical studies, several studies introduce additional determinants of income inequality in a somewhat ad hoc manner, without reference to any particular theoretical framework. For example, Chenery and Syrquin (1975) introduce three variables (other than per capita incomes) as regressors viz., the share of agriculture in total output, the share of primary exports in total exports, and the percentage of school enrollment, as indicators of a country's level of development. Ahluwalia (1976) introduces a socialist dummy variable in his regressions to account for the possible differences in structural characteristics of countries with Socialist political regimes. Others focus on specific determinants of income inequality drawn from recent theories linking inequality and growth, viz. political economy factors and capital market imperfections (Li et al., 1998; discussed below) or develop an independent theoretical framework for analysing the determinants of inequality within the economy (Bourguignon and Morrisson, 1990). We discussed the Bourguignon-Morrisson framework at length in the previous chapter. Within this framework, individual endowments, goods and factor prices and market imperfections emerge as key determinants of personal income distributions within an economy. However we argued that this framework is not entirely appropriate in the context of developing economies with huge reserves of unemployed and underemployed labour. Essentially, with the exception of Anand and Kanbur (1993a), this class of studies does not directly analyse

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inverse.

the change in the inter-sectoral composition of output and employment and its implications for changes in income inequality. As discussed below, Anand and Kanbur focus precisely on this issue, but in their empirical analysis they choose a functional form involving per-capita income and its inverse as the independent variables. That is, they do not directly incorporate variables relating to structural change in the empirical part of their analysis.

In this context Li et al. (1998) is a recent study of the determinants of personal income distributions. Li et al. study very closely the main features of the cross-country, income inequality data set compiled by Deininger and Squire (1996a). They note that income distribution tends to be relatively stable over time within countries, while it varies widely across countries. They argue that this is due to a set of political economy factors and due to the existence of certain credit market imperfections. The rich use their lobbying power to protect their income shares, while the poor do not have access to credit due to market imperfections. As such the poor are unable to accumulate capital (either physical or human capital) that would enable them to improve their economic conditions. Hence inequalities in income distribution tend to persist over time within countries and differ widely across countries with different credit market conditions and political institutions. We argue, that in addition to the factors Li et al. mention, the Kuznets process could be one other factor explaining the stability of income distributions over time. While these authors focus on political economy and institutional factors as important determinants of the overall distribution of income, they do not bring out the importance of structural change *per se,* which we argue could also be an important factor that influences the distribution of income.

What the Studies Conclude There is mixed evidence from these studies regarding the existence of the inequality-development relationship implied by the Kuznets curve. While some studies find an inverted U shaped relation between per capita income and inequality (eg. Chenery and Syrquin, 1975; Ahluwalia, 1976; Bourguignon and Morrisson, 1990; and Ogwang, 1994), others, particularly those based on panel data (eg. Anand and Kanbur, 1993b; Deininger and Squire 1997; and Bruno et al. 1998)

demonstrate that the Kuznets curve does not exist. In fact a number of studies find evidence of a U-shaped relation between income and inequality (Anand and Kanbur, 1993b; Deininger and Squire, 1996c and Fields and Jakubson, 1995).

The chief concern of the literature reviewed above is to establish the existence of the Kuznets curve in cross-section data, but several studies introduce additional determinants (other than per capita income) of income inequality in a somewhat ad hoc manner. Our analysis differs from the existing literature in the following way. We are interested in studying the "Kuznets process"[10] rather than the "Kuznets curve". That is why we do not directly study the relation between income inequality and per capita income, as do studies that test for the existence of the Kuznets curve. Our primary interest lies in analysing the Kuznets process, which refers to the structural change that typically accompanies growth in developing countries, involving a fall in the share of the agricultural sector in output and employment and a rise in the shares of the non-agricultural sectors (industry and service). Our discussion above (Section 1.1) reveals that this process of structural change has certain distinct implications for changes in the overall distribution of income in the economy. As such the determinants of inequality that we focus on follow directly from the theoretical underpinnings of the Kuznets Curve and are not arrived upon in an ad hoc fashion. In fact we show below that the measure of income inequality that we use can be expressed as a function of sectoral output and employment shares.

As mentioned above, the recent data set on income distribution compiled by Deininger and Squire (1996a) makes available a set of fairly reliable and comparable time series data on a large number developed and developing countries. This allows comparison of the relation between structural change and income inequality over a fairly long period of time, for a reasonably large number of developing countries. These results are discussed in detail in Section 2, but before that we set out the relation between income inequality and the structure of output in the economy based on Anand and Kanbur (1993a).

[10] Anand and Kanbur (1993a) coined this term. These authors also explore the relation between stuctural change and income inequality. However, their objective is primarily to explore how this would affect the functional form of the standard 'Kuznets Curve' relation.

1.3 Income Distribution and Structural Change The relation between income distribution and the sectoral composition of aggregate output and employment is formally analysed by Anand and Kanbur (1993a). These authors show that the Lorenz class of indices that measure income inequality are aggregable, in the sense that overall income inequality can be expressed as a function of sectoral-per capita incomes, -income inequalities and -population shares. Specifically, when income inequality is measured by the Gini coefficient (which belongs to the Lorenz class of indices), the authors derive a specific functional form between these sectoral parameters and overall inequality, in the context of a two-sector economy with non-overlapping sectoral income distributions. The Gini coefficient can be interpreted in terms of the expected value of the difference between the income of two recipient units chosen at random (see Pyatt, 1976). In light of this the Gini coefficient can be decomposed in terms of sectoral Gini coefficients, by considering the possibility that the two recipient units are drawn from the same sector or from different sectors. For non-overlapping sectoral distributions the functional form they derive is the following :

$$G = \{(l_b^2 . y_b . g_b) / y + (l_a^2 . y_a . g_a) / y\} + \{l_a . l_b . (y_b - y_a) / y\} \text{ ---------- (1)},$$

where, $y = l_b.y_b + l_a.y_a$; and the symbols used have the following meaning,

G = Gini coefficient measuring overall income inequality in the economy; g_a, g_b = Gini coefficients measuring income inequality within sectors a and b ; X = total output produced in the economy; X_a, X_b = the value of total output produced in the a and b sectors; N = total population in the economy; N_a, N_b = the total population in sectors a and b; y = per capita income for the whole economy [$y = (X_a + X_b) / N$]; y_a , y_b = per capita incomes in sectors a and b [$y_a = X_a/N_a$ and $y_b = X_b/N_b$]; and l_a, l_b = proportion of population in sectors a and b [$l_a = N_a/N$ and $l_b = N_b/N$].

The second term in curly brackets in the above equation, $\{l_a . l_b . (y_b - y_a) / y\}$ is the 'between-sector' or inter-sectoral component of overall income inequality. It shows the mean income difference of two recipient units, chosen at random from different sectors,

in terms of their mean values. It is the value of the Gini coefficient for the entire population when all income recipient units in one sector receive the same level of income i.e. y_a or y_b. The first term in curly brackets in this equation, $\{(l_b^2 . y_b . g_b) / y + (l_a^2 . y_a . g_a) / y \}$ is the 'within-sector' or intra-sectoral component and it is measured residually as the difference between the overall level of inequality and the inter-sectoral component.

Relation between Income Inequality and Sectoral Output Shares We now set out how our approach differs from that of Anand and Kanbur (1993a) discussed above. We argue that the relation between structural change and income inequality is brought out directly and therefore more clearly in the functional form that we estimate. The derivation of this equation is given below.

We can rewrite equation (1) as ,

$$G = A. y_b/y + B . y_a/y \text{ ---------- } (2),$$

[where, $A = (l_b^2 . g_b + l_a.l_b)$ and $B = (l_a^2.g_a - l_a.l_b)$].

However this expression does not clearly bring out the relation between change in the inter-sectoral output structure and income inequality.

Now we can show that,

$$y_b/y = x_b / l_b \quad \text{and} \quad y_a/y = x_a / l_a \text{ ---------- } (3)$$

where, x_a, x_b are the shares of output of sectors a and b in total output, i.e., $x_a = X_a/X$ and $x_b = X_b/X$; y_a , y_b , are per capita incomes in sectors a and b, i.e., $y_a = X_a/N_a$ and $y_b = X_b/N_b$; and l_a , l_b are the proportions of population in sectors a and b, i.e., $l_a = N_a/N$ and $l_b = N_b/N$.

Substituting (3) in (2) we get the following functional form for the economy-wide Gini coefficient :

$$G = \{l_b . g_b + l_a\} . x_b + \{l_a . g_a - l_b\} . x_a \quad \text{----------(4)}$$

Clearly, in a two sector world (with non-overlapping sectoral distributions), the Gini coefficient can be expressed as a linear combination of sectoral output shares, where the coefficients are functions of sectoral population shares and inequality within sectors. Let 'a' represent the agricultural sector and 'b' the non-agricultural sector. How overall inequality in the economy will be affected by a change in sectoral output shares will depend upon two things, viz. how the share of employment in each sector and inequality within each sector changes with the change in output shares. This issue will be discussed once again in Section 3 of this chapter when we undertake a simple regression analysis and attempt to analyse the empirical relation between change in economic structure (as measured by change in sectoral output shares) and change in overall income inequality in the economy.

In what follows we examine the data on income inequality and sectoral output shares for a set of developing countries of Asia and Latin America and try to analyse how income inequality is related with structural transformation in these economies. Basically our objective is to evaluate the empirical evidence in support of our hypothesis regarding the "Kuznets Process"(i.e. the relation between the change in output shares and income inequality in these countries).

2 The Empirical Analysis

In this part of our analysis we focus on eighteen developing countries – ten from Asia (Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Sri Lanka, Philippines, Thailand and Korea) and eight from Latin America (Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela). We examine the empirical aspects of the hypothesis on the relation between change in economic structure and overall income inequality for these countries over the period 1960 to 1994. Our choice of particular countries and of the exact period of analysis is dictated by the constraints imposed by the

availability of data, especially data on income inequality, which is based on the Deininger-Squire dataset[11]. The details regarding the criteria for selecting countries in the final dataset and exact year for which data on each of the variables is available, are set out in Part A of the Appendix to this chapter, under the subsection, "The Final Dataset".

We study the relation between structural change and income inequality for these eighteen developing countries. Structural change essentially refers to the process of change in the sectoral composition of aggregate output and employment. In this section, however, we concentrate on changes in sectoral output shares. This is because data on this variable is available for our entire period of analysis. On the other hand, reliable data on sectoral employment shares, particularly data that is comparable across a large group of developing countries, is scarce. However we do analyse the empirical evidence on sectoral employment shares on the basis of the limited data that we have, in the next chapter (Chapter 4). We shall discuss this issue further in the concluding section of this chapter. For the current empirical analysis, changes in the shares of output of each of the three sectors (agriculture, industry and service) in total GDP, are taken as a measure of structural change within the economy. We first analyse the nature of structural change that occurred in the developing economies over our period of analysis. Next we study the changes in the distribution of income that occurred over the same period, where the Gini coefficient is used as our measure of income inequality. Our choice of index of income inequality is dictated entirely by the availability of data. The Gini coefficient is the only measure of income distribution available that is comparable (with some adjustments, discussed in the Appendix) across a fairly large number of countries and for which we have observations over a reasonably long period of time[12]. We study the nature of structural change and change in the distribution of income for these economies and try to analyse the relation between the two in light of the Kuznets hypothesis.

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[11] We use only the 'high-quality' observations on Gini coefficients from the dataset compiled by Deininger and Squire (1996a). Characteristics of the 'high quality' data are given in Part A of the Appendix to this chapter, under the subsection, "Sources of Data".

[12] Data on income shares of population quintiles is also available in Deininger and Squire (1996a), however this data is available for a fewer number of countries and for most countries, for a fewer number of years as compared to data on Gini coefficients. As such we do not use an inequality measure based on this data for our main empirical analysis. However we report regression results using an alternate measure of inequality

2.1 Data Analysis In what follows we analyse the available data to get a broad picture of the nature of structural change and the pattern of income distribution within the two groups developing economies of Asia and Latin America.

The Sectoral Composition of Aggregate Output The starting point of our analysis is the decade of the 1960s, the earliest point in time for which data is available on sectoral output shares for each country in our sample. Initially, in the 1960s decade, the service sector was by far the largest in terms of contribution to total output in these economies (see Table 1 below). It accounted for over half of total output in the Latin American economies and for about two-fifth of total output in the Asian ones. Industry accounted for a much smaller proportion of the non-agricultural sector (in terms of share in output) in both groups of countries. Regarding the agricultural sector, a larger share of total value added is accounted for by agriculture in the Asian economies than in the Latin American ones. Thus an important similarity between the Latin American and Asian countries at this stage, is the importance of the sevices sector in terms of contribution to total output. The difference lies in the relative size of the agricultural sector, where a significantly higher proportion of total output (over a third) of the Asian economies is accounted for by agriculture than in the Latin American ones (less than a fifth). In particular, in the Asian economies agriculture accounted for a larger share of total output than industry, unlike in the Latin American case.

Table 1 : Sectoral Composition of Total Output for the Period 1965 – 69 (% GDP)

Sectors	*All Countries*	*Latin America*	*Asia*
Agriculture	27.52	17.22	35.76
Industry	25.89	29.69	22.85
Services	46.59	53.08	41.39

Source : World Bank (2000)

Note :

- The values of the variables are 5-yearly averages for each country-group.

based on the ratio of income shares of the top 20% to the bottom 40% of the population. This does not change any of our results (also see Footnote 23, page, 67).

- Average values are taken to ensure comparability with the data on Gini coefficients for which we have to consider average values, as continuous time series data are not available for all countries in the sample.
- We consider the data for the latter half of the sixties decade as we do not have averages based on all 18 countries for the period 1960-1964.

By the close of our period of analysis the sectoral composition of output changed for both groups of countries, but in particular, the changes were marked for the Asian economies (see Table 2 below). For the Latin American countries, on average, the ranking of the three sectors (in terms of the relative size of each sector's contribution in aggregate output) remained unchanged. Whereas for the Asian countries, though the service sector remained the largest in terms of share in total GDP, it was now followed by industry in second place and agriculture in third. In fact the share of agriculture in total output declined by nearly 15 percentage points on average in the Asian economies, which is almost twice the magnitude of change experienced by the Latin American countries.

Table 2 : Sectoral Composition of Total Output for the Period 1990 – 94 (% GDP)

Sectors	*All Countries*	*Latin America*	*Asia*
Agriculture	16.66	10.58	21.52
Industry	33.84	33.67	33.97
Services	49.50	55.74	44.51

Source : World Bank (2000)

Note:

- The values of the variables are 5-yearly averages for each country-group.
- Average values are taken to ensure comparability with the data on Gini coefficients, for which we have to consider average values, as continuous time series data are not available for all countries in the sample.

The common characteristics of structural change over our period of analysis in both country groups are, the marked decline in the share of the agricultural sector, along with significant rise in the share of industry and a relatively small increase in the share of services in total output. However in terms of magnitude, the relative change in sectoral output shares is more marked for the Asian economies, where on average, the share of agriculture in total output declined by nearly 15 percentage points while that of industry

rose by over 10 percentage points between 1960 and 1994. By the end of the period the share of industry in both groups of countries is almost the same, while at the beginning this share was higher for the Latin American countries, thereby indicating faster growth of industrial value added in the Asian countries.

Regarding the income-distribution implications of structural change, we would expect, following Kuznets's arguments, that income inequality would increase in both sets of countries. In particular, intuitively, on the basis of this argument it seems rational to expect inequality to increase more for the Asian than the Latin American economies. Though, strictly speaking Kuznets (1955) does not make any specific arguments regarding the magnitudes of change in economic structure and the degree of inequality in the distribution of income. We now go on to examine the actual change in income distribution that occurred over this period of time.

The Pattern of Income Distribution At first glance the data presented in Table 3 (below) seems to provide some empirical support to our hypothesis.

Table 3 : Changes in the Distribution of Income (1960 – 1994)

Countries	*Gini Coefficient*		
	1960-64	*1965-69*	*1990-94*
All Countries	42.83 (12)	41.57 (10)	45.68 (16)
Latin America	52.83 (3)	51.67 (2)	54.23 (7)
Asia	39.49 (9)	39.05 (8)	39.03 (9)

Source : Deininger and Squire (1996a) and UNDP (1999)

Note :

- The Gini coefficients reported are average values for each country group, over the 5- year periods reported. However continuous data over the 5 years is not available for each country, therefore even for each country the average figure calculated does not often represent actual inequality over the full five years.
- The numbers in parentheses below each variable value represents the number of countries on which these averages are based. Names of the countries and details regarding the years for which observations are available are listed in Table 2A in the Appendix Tables at the end of this chapter.

For the entire group of eighteen developing countries, on average, income inequality actually increased over the period 1960-94, when the countries underwent the kind of structural change that Kuznets had described, viz. a decline in the share of agriculture and a rise in the share of industry in total output. However, the magnitude of change in inequality is quite small as compared to that of the changes in the structure of output. For all the countries in our sample taken together, on average, between the periods 1965-69 and 1990-94, the share of agriculture decreased by over 10 percentage points (there was a corresponding rise in the shares of industry and services) (Tables 1 and 2). Over the same time frame, on average, income inequality in all the nations taken together, increased by just over 4 percentage points (Table 3). This seems to indicate that the degree of inequality in income distribution changes more slowly over time relative to changes in economic structure.

Examining the data on inequality separately for each country group reveals that income inequality increased only within the Latin American countries. The number of countries in the Latin American sample in the 1960s is too small to draw a firm conclusion, at least in the aggregate, regarding change in inequality between 1960 and 1994. However, we check that, (a) in 3 of the 4 countries (Brazil, Chile and Mexico) for which data on inequality is available in the 1960s decade, income inequality increased between 1960 and 1994[13]; and (b) for six of the eight Latin American nations in our sample (Costa Rica and Peru being the two exceptions), comparing the earliest and the latest year for which data is available, we find that income inequality registered an increase. Finally, it is clearly evident from the data that income inequality increased fairly sharply in almost all countries in the sample over the decade of the 1980s[14].

For the Asian countries, with a few exceptions, income inequality remained virtually unchanged over our period of analysis. In most Asian countries, except for China and Thailand (where inequality rose over the 1980s decade), the Gini coefficient changed

[13] In Costa Rica income inequality remained virtually unchanged over the 35-year period under consideration.

very little and fluctuations in the Gini coefficient stayed within a narrow band. Comparing the figures for 1960-64 and 1990-94, in some cases eg. Bangladesh, Philippines and Sri Lanka the Gini even fell a little. However, from here we cannot say without ambiguity that income inequality fell in these countries. For often, as in the case of Bangladesh and Sri Lanka the drop in Gini may reflect a change in the underlying method of calculating this coefficient[15]. For instance, for the latest two years for which income distribution data is available for Bangladesh (1989 and 1992) and for the latest year for which data is available for Sri Lanka (1990) the Gini coefficient represents *expenditure,* rather than income, inequality. We adjust for this change in definition by increasing the expenditure based coefficients by 6.6 (as suggested by Deininger and Squire, 1996 and Li et al., 1998). Typically inequality with respect to expenditures tends to be less than inequality with respect to the distribution of income. Since individuals save a part of their incomes and since in general, the marginal propensity to save rises with the level of income, these two factors together tend to make inequality with respect to the distribution of expenditures, less than inequality with respect to incomes. This is reflected in the Deininger-Squire dataset, where on average, income based Ginis tend to exceed expenditure based Ginis by a factor of 6.6. This is why these authors suggest adding 6.6 to the income Ginis to make them comparable with the expenditure Ginis. Since the figure 6.6 is an average, in some cases it would underestimate and in some overestimate the actual difference between income and expenditure Ginis. We note that while adjustment by 6.6 would help reduce the bias it may not eliminate it completely.

Summing Up We now try and assess the empirical facts for the individual country groups in light of the Kuznets hypothesis. At first glance, for the Latin American countries, the Kuznets hypothesis seems to hold. There is a decline in the share of agriculture and a rise in the shares of industry and services in total output and this is

[14] The only exception is Costa Rica where the Gini coefficient remained practically unchanged over the 1980s. For Colombia we do not have observations on the Gini coefficient at the beginning of the 1980s decade, but there was an increase in income inequality between 1985 and 1990.

[15] We know that income inequality changes slowly over time. Therefore when we observed a fairly sharp fall in the Gini coefficient over a relatively short span of time for some countries, and when we noted that this lower estimate was an expenditure Gini (where the previous estimates were income Ginis), it appeared that part of the observed decline in Ginis might actually reflect a change in the underlying method of calculation.

accompanied by a rise in overall inequality in the economy. The underlying assumption here is that per capita incomes and income inequality within the non-agricultural sector, particularly the industrial sector, is higher than that within the agricultural sector. There is some empirical support for the latter assumption regarding intra-sector income inequalities. For the Latin American countries, with a few exceptions, in most cases rural inequality tends to be lower than urban inequality (see Table 1A in the Appendix, Pages, 86-87). The Gini coefficient for rural areas is assumed to represent inequality within the agricultural sector and that for the urban areas is taken as a proxy for inequality within the non-agricultural sector, particularly industry. However, another factor that is sure to have influenced income inequality in the Latin American nations is the experience of the debt crisis and ensuing structural adjustment policies of the 1980s. In fact we find that in virtually every Latin American country in our sample (with the sole exception of Costa Rica) the distribution of income became more uneven over the eighties decade. We will have more to say on this later in this section.

For the Asian countries, on the other hand, the story appears to be quite different. All these countries experienced the kind of structural change that Kuznets describes. However income inequality in the bulk of these countries seems to have remained virtually unchanged. Do we conclude from here that the process of structural change does not affect the distribution of income in the economy in the way that Kuznets outlined ? We argue below that the explanation for this phenomenon may be closely linked with a structural characteristic peculiar to developing countries, viz., existence of an informal sector. This was absent in the developed economies whose experience forms the basis of Kuznets's arguments regarding structural change and income distribution, which is why he ignores this issue completely. However it is surprising that subsequent work in the Kuznetsian tradition has also chosen not to incorporate the role of the informal sector in the context of developing economies. For, there is ample evidence that bears out the growing importance of this sector in developing economies across the world. In fact according to some estimates almost 60% of the workforce in developing countries operate in the informal sector (Ihrig and Moe, 2000).

The Kuznets Hypothesis and Developing Countries Following Kuznets, we expect overall income inequality to increase with a fall in the share of agriculture and a rise in the share of the non-agricultural sectors in aggregate output. The reason for this is as follows. For Kuznets, the transformation of a primarily agrarian economy into an industrial one, essentially involves a change not only in the composition of aggregate output but also in the structure of employment. He assumes that for a developing economy, structural transformation would essentially involve the creation of new employment opportunities in the industrial sector, for a population that was otherwise largely dependent on agriculture. Over time therefore there is a change in the structure of employment of countries going through such structural change, with an increase in the share of the total workforce in the industrial sector and a decline in the corresponding share within the agricultural sector. In working out the distributional implications of this process of change, Kuznets assumes that, (a) per-capita income in the industrial sector is higher than that within agriculture and (b) that the distribution of income is more unequal within the industrial sector than within agriculture. These two factors together ensure that inequality increases as labour moves from the agricultural to the industrial sector. That is, as individuals move from a low-income sector to one where they earn higher incomes and as the population-weight of a sector with relatively higher intra-sector inequality increases, overall inequality within the economy tends to increase.

Kuznets's explanation, for his empirical observations regarding change in income inequality in the process of development, is based on his understanding of the development experience the industrialised nations. In particular, there are two aspects regarding the nature of structural change in *developing* economies that he does not explicitly discuss in analysing its implications for overall income distribution within the economy. These are, (a) the importance of the service sector both in terms of employment and output in the early phases of development and (b) the role of the 'informal' sector, which accounts for a large proportion of output and employment in developing economies the world over. We discuss below the implications of each of these structural features of a developing economy for changes in the distribution of income.

The Role of the Service Sector Based on the pattern of historical development in countries such as the UK, USA, Germany etc., Kuznets (1955) seems to reason that the natural transition of an agrarian economy would first involve the growth of an industrial sector and *then* there is a mature phase where the service sector expands. However the actual experience of developing countries indicates that the service sector is quite sizeable, in terms of contribution to aggregate output [16], while the industrial sector is relatively much smaller in size. In fact, unlike the post-war trend in Western European countries, a large segment of the labour force in developing nations moved directly from agriculture to the service sector, without contact with the industrial sector (see UNCTAD, 1988; Nayyar, 1994).

Regarding the role of the service sector in affecting the distribution of income, Kuznets's analysis runs along the following lines. In the 'first' phase of development, when there is a transition from an agricultural to an industry-based economy, inequality increases, because per capita incomes and intra-sector inequality are both assumed to be higher within the industrial sector than within agriculture. In the 'second' phase of development, after the agriculture-industry transition, Kuznets observes a tendency for income inequality to actually decline in the developed economies. According to him, one of the reasons underlying this tendency is the expansion of the service sector in this phase of development. He argues that incomes in the service sector, unlike profit incomes, have a natural upward bound and thus do not increase limitlessly. Also in this 'mature' phase of industrial development, per-capita income levels within the economy are higher than before and the incomes of the lower income groups tend to rise faster in this phase as compared to the agrarian-phase. These two factors, viz., an improvement in incomes at the bottom end of the income distribution and a check on the growth of incomes at the top end, together create a tendency for income inequality to decline in developed countries. And this was reinforced by the emergence of a welfare state and the associated redistributive role of progressive taxation. All these factors together account for the downward sloping arm of the Kuznets curve.

[16] On average, over half of total output of the Latin American economies and more than two-fifth of total output in the Asian economies is accounted for by service output; see Tables 1 and 2 in the text.

We argue that the nature of the service sector in the developing countries is such that even when labour moves into this sector from agriculture, it is possible to conceive of a scenario where this will not have much impact on the overall distribution of income within the economy. This occurs when a large part of the service sector comprises of the informal sector and the growth of informal services in developing countries is a well-documented phenomenon. We discuss below the particular features of an 'informal' sector that might precipitate such an outcome.

Characteristics of the Informal Sector For the developing countries in our sample we observe a tendency for income inequality to increase slightly or remain more or less unchanged over a span of more than three decades. The tendency for inequality to increase along with an agriculture-industry transition can be explained in terms of Kuznnets's analysis in terms of a movement of labour from a low per-capita income, low-inequality sector to a relatively high per-capita income, high-inequality sector. However this theory cannot explain why inequality remains more or less unchanged over a span of nearly thirty decades as in most of the Asian economies. To understand the nature of change in income inequality in the developing economies, we must have a clear understanding of the economic structure of these economies. In particular a structural characteristic of these countries, viz., growth of the 'informal' sector has received little attention in the literature on the Kuznets curve, where the focus is on the nature of changes in per-capita incomes and overall income inequality.

The main distinction between the formal and informal sectors are the following : (a) the formal sector is characterised by capitalist production modes and the informal by traditional modes of production; (b) employment contracts in the formal sector are legally binding (or are formulated within the framework of the existing legal structure), whereas informal sector contracts are generally not backed by courts of law; and (c) wages are lower in the informal than in the formal sector. Typically official sources do not have accurate records of informal transactions; as such official statistics tend to underreport the level of economic activities in this sector. In particular, in available official statistics it is

often not possible to find data classified according to whether it pertains to the informal or the formal sector.

In most developing countries informal sector activities tend to bypass government regulations, especially regarding minimum wage laws and other labour standards. Further this acts as a kind of a residual sector as it tends to absorb, in large part, the bulk of 'unemployment' in the formal sector. In developing countries owing to the pressures of a burgeoning population, the number of job seekers tends to exceed the number of job opportunities available in the formal sector. Typically this residual who fail to get employment in the formal sector get absorbed in the informal sector, albeit at a much lower wage rate. Further owing to (b) above, and because the bargaining power of workers is weaker than that of employers, the quality of jobs in the informal sector, in terms of security of tenure, hours of work, non-pecuniary benefits etc., is distinctly 'lower' than that of jobs in the formal sector. An important feature of developing economies has been the increasing importance of the informal sector in terms of its growing share in both total employment and output. In particular there is ample evidence (mainly based on individual case studies) that supports the growing importance of the informal service sector in developing countries (see for instance, Agenor, 1996; Fields, 1990; Ihrig and Moe, 2000; ILO, 1995 and 1998 and so on).

At this juncture it is worth noting that in developing countries the non-agricultural sector itself has a dualistic structure; the formal and informal sectors can be considered as being analogous to the modern and traditional sectors in Lewis (1954). As such, the low wages prevalent in the informal sector can be compared to the subsistence wages prevalent in Lewis's traditional sector. Thus as workers move from the informal to the formal sector, there is a rise in wages, like the workers moving from Lewis's traditional to the modern sector[17].

[17] Lewis (1954) recognises that wages in the modern capitalist sector would tend to exceed the subsistence wages in the traditional sector. One of the reasons for this, according to him (Lewis, 1954, p. 150), could be ".. because of the psychological cost of transferring from the easy going way of life of the subsistence sector to the more regimented or urbanized environment .." in the capitalist sector.

The Informal Sector and Income Distribution In view of the discussion above, consider the impact, on the distribution of income, of the following kind of transition from an agriculture-based economy. Suppose a fall in the share of agriculture in total output is accompanied by an expansion of output primarily in the informal segment of the non-agricultural sector. Given that wages in the informal sector are low, often those moving from agriculture (where wages are also low) to the non-agricultural sector would not experience any significant rise in incomes, even though they are moving to a sector where average wages (especially in the formal sector) are higher than in the agricultural sector of the economy. In this case, even with structural change, overall inequality in the economy would be relatively unaffected owing to the particular nature of this change. At the very basic level, income inequality is essentially about the *distance* between the incomes earned by the richest and the poorest income earners in the economy. Essentially with the above kind of structural change, there is a flow of labour between sectors that does not involve the poor getting significantly richer. That is, this movement of labour is essentially confined *within* the lower income groups and it does not change the position of the poor classes vis a vis the richer classes in a significant way. That is why this particular kind of structural change tends to leave the overall distribution of income fairly unaffected.

Other Factors affecting Income Distribution The informal sector is less important in a few Asian countries in our sample, particularly, Korea, Malaysia and China (until the 1990s). These countries, particularly Korea and China, had put in place radical agrarian reforms, which undoubtedly accounts for the relatively lower inequality in these countries as compared to the others included in our study. Government policies geared to directly tackle inequality in the distribution of assets (particularly land) in general, and agrarian reforms in particular, have no doubt contributed to keeping income inequality from increasing very much in these countries.

We noted earlier that income inequality increased in all Latin American nations over the eighties decade. Now the 1980s have been referred to as the 'lost decade' in the history of these nations (see for instance, Cardoso and Helwege, 1995; Edwards and Larrain, 1989;

Eichengreen and Lindert, 1991; and Sachs, 1988). It seems plausible to argue that the structural adjustment programs put in place over this period affected the structure of output and employment and therefore the process of income generation and distribution.

There is an extensive literature that deals with the experience of Latin American countries since the debt crisis (for an extensive bibliography see Corbo and Fischer, 1995). The basic points that emerge from it can be summarised as follows. For the Latin American nations, in general, the decade of the 1970s was characterised by mounting internal and external imbalances. Fiscal excesses spilled over to the external accounts and most of these nations built up huge external debt obligations in order to finance deficits. Funds were easily available in the 1970s decade, particularly in the wake of the oil price rise. Oil exporting countries invested oil revenues primarily with commercial banks that, in turn, lent to these countries. However the situation changed in the early 1980s when, in 1982, the US Federal Reserve raised interest rates in a bid to control inflation. Higher interest rates made the USA a more attractive alternative for lenders. As a result, credit availability dropped sharply for Latin America. Alongside there was also a rise in the cost of credit. With mounting interest payments on debt, the burden of debt service increased, while indicators like debt-GDP and debt-export ratios rose steadily for the Latin American countries. The situation worsened further, when consequent upon the interest rate hike in the USA, followed by Europe, economic activity slowed down across these nations. For, this reduced the demand for Latin American exports, and commodity prices crashed, making debt repayment appear increasingly difficult. Matters came to a head, with Mexico declaring a moratorium on debt obligations. This spread in a contagion-like manner in the region and finally most of these nations had to adopt stabilisation and structural adjustment packages administered by international institutions like the International Monetary Fund. Fiscal restraint was an essential part of these policies, and typically, the reduction in deficits came about at the cost of spending on infrastructure, investment on human capital and other social sector spending. On the other hand, with bleak prospects for export growth[18], drastic import compression was necessary in the

[18] Not much could be done to increase exports, as the major export markets in the US and Europe were in the midst of a recession.

short run to manage the external payments crisis. The result of these policies was economic recession which, in effect, slowed down the process of industrialisation across the region[19].

In an atmosphere of economic recession, income inequality is likely to increase, as the demand for labour tends to fall and consequently, the rate of employment creation slows down, and many loose jobs. This tends to create a downward pressure on wages. Further, with cuts in government spending on social sectors, invariably the position of the poorer groups in society become worse. In fact, typically, during an economic slowdown, the poorer income classes lack the ability to protect their real incomes, unlike the relatively richer groups in society and this tends to make the overall distribution of income more uneven. This is especially true in the Latin American countries, where the poor have little 'social security', unlike in many European countries. Further, during an economic downturn the rich often fall back on asset incomes (either from sale of assets or from their yield); whereas, typically the poor lack income earning assets, and tend to suffer a greater fall in real incomes. We argue that in such a situation, the informal sector acts as a residual, absorbing the bulk of those losing employment in the formal industrial sector and also those unable to find 'good' jobs in an environment of economic slowdown. But for this residual role of the informal sector, income inequality would probably have increased even more than it actually did, in the Latin American nations. By absorbing a large section of the population, even at minimal wages, it kept the bottom end of the income distribution from worsening further.

We look for some support for these arguments mainly in the following chapter, when we analyse the available data on sectoral employment shares.

2.2 Econometric Analysis We now undertake an empirical exercise based on estimating an econometric model to gain further insight into the relation between the process of structural change and changes in the overall distribution of income. This

[19] There was a dramatic decrease in investment rates across Latin American nations, particularly in the period 1982-87 (Agarwal et al, 1999).

allows us to answer hypothetical questions like, how would the overall distribution of income be affected, if a decline in the share of agriculture is accompanied by an expansion of the service sector alone, with the share of industry in total output remaining unchanged ? ; and how this compares with a situation where the opposite is true, viz. the share of industry expands, while that of service remains unchanged? In what follows, we first discuss the basic model being estimated and then describe the empirical methodology used. Next we present the main findings from our econometric exercise and conclude with a discussion on their significance for the relation between structural change and income inequality.

The Model The functional form of the equation we estimate is based on the Gini decomposition by Anand and Kanbur (1993a), which is discussed at some length in Section 1 above. However, the functional form we estimate differs from the Anand-Kanbur formulation in an important respect. Anand and Kanbur regress income inequality on *per capita income levels.* We argue that this approach fails to bring out clearly the underlying relation between income inequality and changes in the inter-sectoral output structure. Therefore, we substitute for the per-capita income term in the Anand-Kanbur formulation (using a relation between sectoral income shares and sectoral output and employment shares) and express the Gini coefficient directly as a function of sectoral output shares (the detailed derivation is presented in Section 1.3, Page 46). This approach clearly brings out the relation between income inequality and the process of structural change. Thus we can express economy-wide inequality measured by the Gini coefficient as a function of sectoral output shares, i.e. $G = f(x_a, x_b)$, where x_a and x_b represent the shares of output of the two sectors.

In the discussion above, we focus on three sectors, agriculture, industry and services. That is, the non-agricultural sector is a composite sector, with industry and services as its two main components. The Anand-Kanbur decomposition shows that the Gini coefficient can be expressed as a linear combination of sectoral output shares in a two-sector model. Here the non-agricultural sector (sector b) is a composite sector comprising of two sub-sectors, industry and services. Thus we can express,

$$G = f(x_a, x_b) = f(x_a, x_i, x_s),$$

where, x_a, x_i, x_s are the shares of the agricultural, industrial and service sectors in total output.

Now expressed in percentage terms,

$$x_a + x_i + x_s = 100.$$

Therefore,

$$G = f(x_a, x_i, (100 - x_a - x_i)).$$

Expressing this in linear form,

$$G = \alpha + \beta . x_a + \delta . x_i ,$$

gives the basic equation being estimated. 'β' indicates how income inequality changes with a change in the share of agriculture in total output, when the share of industry is held constant and there is an offsetting change in the share of services (such that the shares of the three sectors always add up to 100). Analogously, 'δ' represents the partial effect of a change in the share of industry on income inequality, holding the share of agriculture constant and with a offsetting change in the share of services. That is, when we estimate this equation, we are essentially treating services as the residual sector, which adjusts passively to changes in the shares of the other two sectors[20]. The constant term 'α' represents the level of income inequality in the economy in the hypothetical case where, both the shares of agriculture and industry are zero and the entire economy is based on services activity.

Thus the final form of the linear equation being estimated is as follows :

[20] We also estimate two other equations, where, in turn, industry and agriculture are treated as residual sectors. For details see the Appendix to this chapter.

$$G = \alpha + \beta. A + \delta.I + \varepsilon,$$

where, G = Gini Index measuring income inequality within the economy, A = Value added in the agricultural sector expressed as a percentage of GDP, I = Value added in the industrial sector expressed as a percentage of GDP and ε = Random error term.

Details regarding the final dataset, data sources, problems related to the data, especially relating to missing data etc. are discussed in Part A of the Appendix to this chapter.

Two sets of regression equations are estimated using the pooled OLS (ordinary least squares) estimation procedure[21]. For the first set we simply club together all eighteen developing countries treating them as a homogenous group. In this case we estimate the equation given above, where we pool data across time for all the countries in the sample.

In the second case we explicitly introduce a dummy variable to control for the structural differences between the Latin American and Asian country groups. That is, for the second set of regressions we estimate the following equation :

$$G = \alpha_L + \beta_L. A + \delta_L.I + (\alpha_A - \alpha_L).D + (\beta_A - \beta_L).(D*A) + (\delta_A - \delta_L).(D * I) + \varepsilon \text{ --------(5)}$$

where, the subscript 'L' represents the values of the coefficients for the Latin American countries and 'A' for the Asian countries; and D is a dummy variable that takes the value 1 for all Asian countries and 0 for Latin American countries.

[21] For the reason we use the pooled ols rather than the fixed effects estimator, see the discussion in Part C of the Appendix to this chapter. For a general discussion on estimation using panel data and for the properties of alternate panel data estimators, see the Statistical Appendix on Panel Data that appears at the end of the dissertation.

The Results[22] The estimated equation in the first case, when we do not introduce dummy variables is :

$$G = 70.28^{*} - 0.61^{*}.A - 0.39^{*}.I \ldots\ldots\ldots (1)', \qquad [\text{Adj. } R^2 = 0.47]$$
$$(3.25) \quad (0.05) \quad (0.08)$$

[Note * represents coefficients that are statistically significant at the 5% level or lower; figures in parentheses below each coefficient is its White heteroscedasticity-consistent robust standard error]

All the coefficients are significant and the value of the adjusted correlation coefficient is quite high as compared to the values normally obtained in such pooled regressions. Our results indicate the when the share of agriculture in total output declines and that of services increases (an agriculture-services transition), economy-wide inequality tends to increase. Income inequality also tends to increase when there is an industry-service transition (i.e. share of industry in total output contracts and that of services increases, holding the share of agriculture constant), but by less than in case of the agriculture-service transition (as indicated by the relative magnitudes of the coefficients). Thus, unlike the experience of the industrialised countries observed by Kuznets, income inequality in developing nations may not show a tendency to decline as the service sector expands. An interesting result is indicated by the value of the constant term, which as we discussed pertains to income inequality in the economy in the hypothetical situation when both A and I are zero and the service sector accounts for the bulk of economic activity. In fact this gives an idea regarding inequality *within* the service sector itself. Interpreted in this way we find that within-sector inequality is highest within the service sector, followed by industry, and the lowest within agriculture (see Appendix, Part B, section (a)).

[22]We recognise that the Gini coefficient has a number of limitations as a measure of inequality (see for instance, Ray, 1998). As such we also estimated the above equations with an alternative, complementary measure of income inequality viz., the ratio of the income share of the richest 20% to that of the poorest 40% of the population. The results obtained through the latter measure are the same (see Footnote 23, Page 67). However the latter data set is far more limited. For in the Deininger-Squire dataset, there are even fewer observations on percentile shares for each country than on Gini coefficients. Therefore the regression with the percentile shares ratio as the dependent variable could only be run with a much smaller dataset containing 85 observations. Hence we used the results based on the Gini coefficients for the rest of the analysis. However these results demonstrate the robustness of our empirical findings.

With Dummy Variables When a dummy variable is introduced (i.e. the form of the equation being estimated is given by (5) above), to control for the possible differences in results for the two country groups in our sample, we get the following results[23]. The estimated equation in this case is :

$$G = \underset{(6.39)}{52.33^{*}} + \underset{(0.14)}{0.09.A} + \underset{(0.15)}{0.00.I} + \underset{(8.34)}{11.53.D} - \underset{(0.17)}{0.34^{*}(D*A)} - \underset{(0.18)}{0.38^{*}(D*I)}, \quad \ldots\ldots\ldots(2)'$$

[Adj. $R^2 = 0.55$]

[Note * represents coefficients that are statistically significant at the 5% level or lower; figures in parentheses below each coefficient is its White heteroscedasticity-consistent robust standard error]

The regression results are discussed in detail in the Appendix (see Appendix, Part B, section (b)). The main result that emerges from this exercise is that an agriculture-industry transition (i.e. a fall in the share of agriculture and a rise in the share of industry, holding the share of services in total output constant) does not affect income inequality in either country group. This actually runs counter to the main hypothesis underlying the Kuznets process, viz., that a transition from agriculture to industry would lead to an increase in income inequality. Further, the impact of structural change upon the distribution of income differs in an important respect between the two country groups. For the Latin American countries, neither an agriculture-services transition (i.e. a fall in the share of agriculture and a corresponding rise in the share of services in total output,

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[23]Using an alternate measure of inequality, Ineq (ratio of share of the top 20% to the bottom 40% of income earners) as the dependent variable we get the following results :

(a) with shares of Agriculture and Industry as dependent variables

$$Ineq = \underset{(0.17)}{3.25^{*}} + \underset{(0.04)}{0.02.A} + \underset{(0.04)}{0.04.I} + \underset{(1.11)}{2.69.D} - \underset{(0.03)}{0.09^{*}(D*A)} - \underset{(0.04)}{0.08^{*}(D*I)}, \quad \ldots..(1)$$

[Adj. $R^2 = 0.47$; Nob = 85]

(b) with shares of Agriculture and Service as dependent variables

$$Ineq = \underset{(2.86)}{7.33^{*}} - \underset{(0.03)}{0.02.A} - \underset{(0.04)}{0.04.S} - \underset{(2.25)}{5.56^{*}.D} + \underset{(0.34)}{0.11.(D*A)} + \underset{(0.03)}{0.08^{*}.(D*S)}\ldots\ldots..(2)$$

[Adj. $R^2 = 0.47$; Nob = 85]

holding the share of industry constant), nor an industry-services transition has much impact upon overall inequality in these economies. While for the Asian countries we find that, both an agriculture-service transition and an industry-service transition would tend to make the overall distribution of income more uneven.

The main results from our regression exercise can be summarised as follows :

(a) Structural transformation *per se* does not seem to affect income inequality within the Latin American countries in our sample. For neither an agriculture-industry transition nor a service-industry transition or an agriculture-service transition has any affect on income distribution for these countries.

(b) An agriculture-industry transition does not affect income distribution in the Asian economies. However a transition involving the service sector may lead to a worsening of income distribution. For inequality tends to increase with either an agriculture-service transition or an industry-service transition.

(c) The constant term in the regression with the shares of agriculture and industry as independent variables, indicates what inequality would be in a scenario where both these output shares were zero, and the entire economy was based on service sector activity. This term is interpreted as being indicative of inequality within the services sector in this counterfactual scenario. Analogously we obtain estimates that are indicative of inequality within the agriculture and industrial sectors as well (from regressions of the Gini coefficient (i) on the shares of service and industry and (ii) on the shares of agriculture and service, respectively). The main result we get from here is that in both country groups inequality is lowest within the agricultural sector. This result is in line with the Kuznetsian assumption underlying the relation between structural change and income distribution[24]. Our estimates also indicate that for the Asian countries, inequality is highest within the services sector, whereas for the Latin

[24] Kuznets (1955), assumes that inequality within the agricultural sector is lower than (or no higher than) that within the non-agricultural sector.

American economies, it is more or less similar within the industrial and services sectors.

Analysis of Results The most important result that emerges from our regression analysis is that a transition from agriculture to industry does not affect income inequality in either country group. We discuss the implications of this result in turn for each country group.

For the Latin American countries, it is not simply an agriculture-industry transition, but the process of structural transformation per se does not seem to affect the overall distribution of income. We have already noted that there are many gaps in the data on income distribution for the 1960s and 1970s, pertaining to these economies. As such the regression results primarily reflect changes that occurred in these countries over the 1980s decade onwards. Therefore the eighties debt crisis (and the policy response to it) is likely to have a lot to do with the results we have obtained. We have already discussed that the policy regime in the Latin American countries in the aftermath of the debt crisis, with its emphasis on fiscal restraint and import compression, reinforced recessionary conditions. We argued that such conditions are likely to make the overall distribution of income more uneven. In this context we interpret the regression results as indicating that rather than the process of structural change, other factors such as government policies, especially policies causing economic slowdown, are likely to have affected income inequality in the Latin American countries.

Our results seem to fit the Asian experience rather well. For the data indicates that even as these economies underwent substantial agriculture-industry transition, income inequality remained more or less unchanged. This can happen, for instance, when the movement of labour from agriculture to industry is primarily confined within the informal segment of the sectors. Such movement of labour within the low-wage segment of sectors does not significantly alter the gap between top and bottom incomes and therefore, overall inequality within the economy.

In the Asian case, our results also indicate that either an agriculture-service transition or an industry-service transition would lead to a rise in inequality. Now for the Asian economies, income inequality is likely to be quite high within the service sector for the following reasons. It is a well-established fact that informal services account for a large proportion of the informal sector in most developing countries and that informal sector wages are among the lowest in the economy (ILO, 1995 ; 1998). Thus on the one hand the service sector comprises of a segment of income earners who earn some of the lowest wages in the entire economy. On the other hand, considering the service incomes of top doctors, lawyers, financiers and bankers, it is apparent that some of the highest wages in the economy are also earned in this sector[25]. This stark contrast between top and bottom incomes would tend to make the distribution of income within the service sector extremely skewed. In all probability, our results involving the service sector reflect this fact.

Another point worth discussing is the relatively low degree of income inequality within the agricultural sector in the Asian economies. Low, both in comparison to inequality within the non-agricultural sectors and also to inequality within agriculture in the Latin American nations. Possibly the fact that we have countries like China and Korea in our sample has a lot to do with this result. These countries have had sweeping land reforms, which have directly removed inequality of land ownership and hence of income. Second agriculture in the Asian nations, especially South Asia, is characterised by small-scale land ownership among the peasantry. In contrast, much of Latin American agriculture is characterised by large landowners; the distribution of land holdings in highly unequal, and attempts at land reforms have not been entirely successful. These two factors would explain to a large extent the relatively low degree of inequality within agriculture in the Asian nations and the reason why it is so much lower than in the Latin American nations.

[25] In particular, with greater openness in the developing countries, multinational capital has increasingly sought to relocate activities to the developed world and hire the services of labour that is much cheaper in comparison with their developed country counterpart (see for instance, Oxfam, 2002).

3 Conclusion

The basic question we finally address is to what extent does structural transformation explain the actual pattern of change in income inequality observed in the Asian and Latin American economies. We note that our empirical analysis essentially picks up statistical correlation, which does not establish economic causation. We mindful of this as well as the fact that a number of other factors are also at work which may affect the overall distribution of income, as we interpret the main results from our empirical exercise. We saw that income inequality remained more or less unchanged over our period of analysis for the Asian countries, while it increased in the Latin American countries. To what extent, on the basis of our regression exercise, can we claim that the pattern of structural change essentially explains the nature of change in income inequality in these economies?

Regarding the Latin American economies, our results indicate the importance of factors other than structural change as being primarily responsible for changes in the overall distribution of income. In particular, they point to the importance of government policies in shaping the overall economic parameters, which in turn affect incomes at the top and bottom ends of the distribution.

Our main result, that an agriculture-industry transition does not affect overall inequality, seems to fit the Asian experience rather well. These countries underwent an agriculture-industry transition and yet did not experience much change in overall income inequality. These results seem to provide some preliminary support to our argument regarding the importance of the informal sector in affecting the overall distribution of income. However to say more about this we must examine evidence on inter-sectoral labour movements for these would have an important bearing on the relation between change in output shares and the overall distribution of income.

In the next chapter, we shall essentially examine the relation between sectoral employment shares, relative labour productivity and see how these are related to change in output shares and in income distribution within the economy.

APPENDIX

Part A. Description of the Data

For our empirical analysis we focus on a set of four economic variables. These are, the degree of income inequality (as measured by the Gini coefficient) and the sectoral output structure represented by the shares of agriculture, industry and service in total value added (for each country for any given year, the three output shares add up to 100).

a) **Sources of Data** The data on the shares of agriculture, industry and service in total value added (as % of GDP) are taken from World Bank (2000). The data on the Gini coefficient are mainly taken from Deininger and Squire (DS from now) (1996a). The DS data set has time series data on Gini coefficients and income shares of population quintiles for 136 developed and developing countries[26]. The 'high-quality' data satisfy the following criteria[27] :

(i) the unit of observation has to be either the household or the individual ;

(ii) the coverage of the population has to be comprehensive. For example, if only the urban household distribution of income is available, it is not permissible to translate this directly into the national distribution. The same rule applies if available data is restricted only to the economically active, to wage earners alone etc. ; and

(iii) the measurement of income (or expenditure) has to be comprehensive. That is, income from self-employment and production for self-consumption should be included.

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[26] The data we use are an updated version of the data-base described in Deininger and Squire (1996a), available at the World Bank web site. A number of African countries have been added in this version. As a consequence the number of countries in this version is 136 and not 105 as reported in Deininger and Squire (1996a).

[27] These criteria are similar to those used by Fields (1989a, b) to construct a usable dataset on income inequality.

There are many missing data points in the DS dataset. As such we do not have continuous time series data on Gini coefficients for most countries in our sample. We fill in the gaps in our dataset, using comparable data on Gini coefficients from the UNDP (1999) database whenever this is feasible. However even then there are a number of missing observations on the income distribution variable (see Table 2A below for details regarding missing data).

b) **The Final Dataset** We now set out in detail our criteria for selecting countries for the empirical part of the analysis. Since availability of data on income distribution posed the biggest constraint, we first selected those countries for which distribution data were available. The DS dataset brings together data on 136 developed and developing countries from across the world. Of these, there are 93 developing countries with "high-quality" observations on Gini coefficients for at least one year[28]. Given that income inequality changes slowly over time within a country, we wanted to select all those developing countries for which high quality data was available over a fairly long period of time[29]. Essentially we wanted to study change in distribution for as many countries and as long a period of time as possible, given the availability of data.

Relatively few countries had data for the 1960s decades, which is why we did not make this a criterion for selecting a country[30]. Initially we chose all those countries which had at least one data point corresponding to each of the 1970s *and,* either the 1980s or the 1990s decades. This yielded a set of thirty-two countries – Bangladesh, Brazil, Chile,

[28] Data on percentile income shares is also available, however this data is available for a fewer number of countries and for most countries, for a fewer number of years as compared to data on Gini coefficients. As such we do not use an inequality measure based on this data in our main empirical analysis. However we also run regressions using an alternate measure of income inequality (based on the ratio of the income share of the top 20%, to the bottom 40% of the population) as the dependent variable. This does not change any of our results. The same set of results go through with these regressions which are based on a smaller number of observations as compared to the Gini-regressions.

[29] In order to achieve this objective, data from the DS dataset is at times supplemented with (strictly comparable) data from another recent compilation of data on income distribution, UNDP (1999). The details regarding this are provided in Footnote 31.

[30] Data on sectoral output shares from World Bank (2000) was available only from 1960 onwards. Naturally therefore the starting point of our period of analysis is 1960.

China[31], Colombia, Costa Rica, Dominican Republic, Egypt, Guatemala, Hong Kong, India, Indonesia, Iran, Jamaica, Korean Republic, Malaysia, Mexico, Pakistan, Panama, Peru, Philippines, Puerto Rico, Singapore, Seychelles, Sri Lanka, Taiwan, Tanzania, Thailand, Trinidad, Tunisia, Venezuela and Zambia.

The problem we encountered then was that we had an unequal number of observations (over time) per country. For example, for India there were thirty observations on Gini coefficients covering the period 1952 to 1992 (with a few missing data in the middle), while for Seychelles there were only two Gini coefficients for the years 1978 and 1984. Our objective was to generate a balanced panel dataset with an equal number of observations over time for each country, spanning the period 1960 to 1994. With this view, we divided our entire period of analysis into seven sub-periods of five years each - 1960-64, 1965-69, 1970-74, 1975-79, 1980-84, 1985-89 and 1990-94 and take five-yearly averages of the Ginis[32] and each of the other variables. Now if we chose only those countries which had seven observations (corresponding to each of the seven sub-periods), very few countries (only six) would be selected in the final dataset. To include a

[31] In the DS dataset, Gini coefficients on China are available only from the 1980s decade onwards. However we are still able to include China in our sample because distribution data on China for the 1960s and 1970s was available in UNDP (1999), which puts together data on various measures of income inequality from the DS dataset as well as from other sources. In choosing data from UNDP (1999) we ensure that the data are strictly comparable to the DS data, in terms of unit of measurement (i.e. whether household or individuals), category of measurement (i.e. whether income or expenditure), whether calculations are based on net or gross incomes, coverage of the population (i.e. whether national or regional) and so on. In the final dataset we include data for the following countries and for the following years also from UNDP (1999) : Brazil (1990, 1991); China (1964, 1970, 1978); Colombia (1993, 1994); Mexico (1994); Pakistan (1963); Philippines (1975); Sri Lanka (1969); and Thailand (1971).

[32] However due to the lack of continuous time series data on income distribution, the average values for Gini coefficients do not always cover the entire five year time period. For instance, for Malaysia, the values of each of the dependent and independent variables for the period 1970-74 are actually an average for the two years 1970 and 1973 for which data on income distribution is available. Also for the income distribution variable, when an observation is missing for a country for a particular year, we replace it by an observation from the closest year available in the preceding five years. Since the distribution of income within an economy tends to be relatively stable over short periods of time, this should not affect our results significantly. For example no data is available for Malaysia for any of the years corresponding to the period 1990-94. However data is available for 1989. So we use the data for 1989 to represent the Gini coefficient for Malaysia for the period 1990-94. Note a number of scholars using the DS dataset have applied this method (see for instance, Forbes, 1997).

larger number of countries therefore, we had to allow for the inclusion of countries with missing observations[33].

In the final dataset only those countries were included for which we had at least 4 observations. This ruled out the inclusion of a number of small Latin American and Caribbean nations, as well as a number of African and Middle-Eastern countries in our final dataset. For instance, for each of Guatemala, Egypt, Puerto Rico and Trinidad, only three observations (per country) were available; Panama, Seychelles and Zambia had 2 observations each; while only one observation was available for Tanzania.

Next we checked the availability of data on sectoral output shares from World Bank (2000). This ruled out the inclusion of Iran because no data was available on sectoral output shares, for the years for which data on Ginis was available for this country. This also ruled out the inclusion of Taiwan as no data was available on this country from this source[34].

Finally, three countries were excluded from the final dataset even though they satisfied our selection criterion (of at least 4 observations per country). These were Hong Kong, Singapore and Tunisia. Regarding Tunisia, we did not want to include only one African country as it did not seem reasonable to consider one country as being representative of the African region in any sense. Regarding Hong Kong and Singapore, these were not included because they are essentially city-states with very little agricultural resources. As such it does not make much sense to talk about an agriculture-industry transition in the context of these economies.

Ultimately we selected eighteen countries, ten from Asia (Bangladesh, China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand) and eight from Latin America (Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico,

[33] For instance, Venezuela, which is included in the final dataset had 2 missing observations, corresponding to 1960-64 and 1965-69.

Peru and Venezuela), which met our selection criteria and yielded a reasonably balanced dataset for the empirical analysis. We had a panel data set with eighteen countries and 7 observations per country, corresponding to average values over the following time periods : 1960-64, 1965-69, 1970-74, 1975-79, 1980-84, 1985-89 and 1990-94. This should have generated a total number of 126 observations, however due to missing observations (particularly on Gini coefficients), there are large gaps in the data set. In fact we have only 103 observations on Gini coefficients (see Table 1A below for details of missing observations for particular countries) and in the final data set we have 102 observations for which data are available for each of the variables in focus.

c) **Data Related Problems** There are several problems related to the income distribution data we use. We include only the 'high quality' estimates of the Gini coefficient reported by DS. These estimates have been compiled so as to ensure intertemporal and international comparability. Specifically they are based on national household surveys and comprehensive coverage of the population and sources of income and uses of expenditure. In the DS dataset, for a number of countries the Gini coefficients represent inequality in the distribution of consumption expenditures (as for India) rather than income. To make the data comparable across countries in this case DS suggest that the expenditure based Gini coefficients be increased by 6.6 points as this is the average difference between income and expenditure based Gini coefficients in the sample. Another problem is that some Gini coefficients are calculated on the basis of gross income and others on the basis of net income. Further, for some countries the basic income recipient unit is the individual, while for others it is the household. In some cases for the same country the definition of the Gini coefficient is different in different years (eg. for Bangladesh the Gini in 1989 and 1992 represent consumption inequality while the other observations all represent income inequality). Li et al. (1998) study the DS dataset in detail and in their regressions they introduce dummy variables to control for these differences in definition. They find only the difference arising due to income- and expenditure-based Gini coefficients is statistically significant. Thus following Li et al. we

[34]For all the other countries in the sample our source of data for the output shares and trade openness variables is World Bank (2000). Hence we did try to include data on Taiwan from any other source as it might not have been comparable with the data for the rest of the countries in our sample.

also adjust the expenditure based coefficients by increasing them systematically by 6.6 points as suggested by DS. All the results reported are based on the adjusted Gini coefficients.

Another problem might have arisen due to the nature of the underlying source of data used for calculation of the Gini coefficients. A recent paper by Milanovich (2002) shows clearly that income estimates based on National Accounts data can diverge (often widely) from estimates based on Household Survey data[35]. In a panel dataset this can lead to bias arising from two sources. First, there can be inter-temporal bias for a single country arising from combining observations based on household data with those based on national accounts statistics. Second, there can be inter-country bias arising from the fact that for some countries income estimates are based on household surveys and for others on national accounts data. However this problem does not arise in our data set, for DS ensure that only Gini coefficients based on household surveys are included in their high quality database[36]. For instance for India, the data are taken from Datt (1994) and all the (expenditure based) Gini calculations are based on NSS (household survey) data.

Part B. Details of the Regression (Pooled OLS) Exercise

(a) Details of Results without Dummy Variables An interesting result pertains to the hypothetical situation when the shares of two of the sectors in total output is assumed zero, and when the third sector accounts for the all of the inequality in the economy. The constant term in the regressions above gives an estimate of this. This also gives a sort of an estimate of the inequality *within* this third sector with non-zero output. Three equations are estimated below, where the constant term represents inequality within the

[35]Typically household surveys underreport (i) undisbursed corporate profits, (ii) income from property, (iii) personal taxes and (iv) government transfers in kind. (i) and (ii) could be classified as capital income , which is the most underreported income category in household surveys. Milanovic (2002) provides further details in this regard.

[36] Deininger and Squire (1996a) "...require that data on inequality be based on actual observation of individual units drawn from household surveys;". In particular the authors "...do not use data based on information from national accounts and some assumption regarding a general functional form according to which different types of income are distributed." [Deininger and Squire (1996a), page 568].

service sector in the first equation, and it represents inequality within industry and agriculture in the second and third equations respectively.

(1) $G = 70.28^{*} - 0.61^{*}.A - 0.39^{*}.I$, [Adj. $R^2 = 0.47$]
(3.25) (0.05) (0.08)

(2) $G = 31.72^{*} - 0.22^{*}.A + 0.39^{*}.S$, [Adj. $R^2 = 0.47$]
(5.59) (0.07) (0.08)

(3) $G = 9.25^{*} + 0.22^{*}.I + 0.61^{*}.S$, [Adj. $R^2 = 0.47$]
(3.37) (0.07) (0.05)

(b) Details of Results after introducing Dummy Variables

The estimated equation in this case is:

(1a) $G = 52.33^{*} + 0.09.A + 0.00.I + 11.53.D - 0.34^{*}(D*A) - 0.38^{*}(D*I)$, [Adj. $R^2 = 0.55$]
(6.39) (0.14) (0.15) (8.34) (0.17) (0.18)

[Note * represents coefficients that are statistically significant at the 5% level or lower; figures in parentheses below each coefficient is its White heteroscedasticity-consistent robust standard error.]

The explanatory power of the regression is quite good as indicated by the fairly high value of the adjusted correlation coefficient. The intercept dummy being insignificant indicates that the constant term of the regression is essentially similar for both sets of countries. That is, according to our interpretation of the regression constant, inequality within the service sector is similar within the Asian and Latin American group of countries. However what differs between the two sets of countries is the impact of structural change upon the distribution of income. For Latin American countries both coefficients of A and I are statistically insignificant. This indicates, neither an agriculture-service transition (i.e. a fall in the share of agriculture and a corresponding rise in the share of service in total output, holding the share of industry constant), nor an industry-service transition would have much impact upon overall inequality for the Latin American economies. While for the Asian countries we find that, both an agriculture-

service transition and an industry-service transition would tend to increase the level of inequality in the economy.

In reality however we observe not only an agriculture-service transition for these two groups of countries but also essentially an agriculture-industries transition. We now re-estimate the above equation, with the shares of agriculture and service as regressors. This gives an idea as to how income inequality would change if the share of industry were to rise with a decline, especially in the share of agriculture in total output. The estimated equation is :

$$(1b)\ G = \underset{(9.5)}{52.61^{*}} - \underset{(0.14)}{0.10.A} - \underset{(0.15)}{0.00.S} - \underset{(10.98)}{26.26^{*}.D} + \underset{(0.16)}{0.03.(D*A)} + \underset{(0.18)}{0.38^{*}.(D*S)},\quad [\text{Adj. } R^2=0.55]$$

[Note * represents coefficients that are statistically significant at the 5% level or lower; figures in parentheses below each coefficient is its White heteroscedasticity-consistent robust standard error]

This equation suggests that neither an agriculture-industry, nor a service-industry transition has any effect of income distribution in the Latin American countries. Regarding the Asian countries it appears that an agriculture-industry transition does not affect inequality, but a service-industry transition (i.e. a fall in the share of service and a corresponding rise in the share of industry, holding the share of agriculture constant), tends to reduce overall income inequality in these economies. The constant term and the intercept dummy are both significant, which indicates that the estimates of inequality *within* the industrial sector are significantly different for the two country groups. In particular the distribution of income within the industrial sector is more egalitarian for the Asian than for the Latin American countries as indicated by the values of the constant terms for each country group (26.35 for Asian countries as compared to 52.61 for the Latin American countries).

We estimate a final equation to get an idea regarding the extent of inequality within the agricultural sector for each country group. The estimated equation is :

(1c) $G = 42.34^{*} + 0.10.I + 0.09.S - 22.97^{*}.D - 0.03\,(D*I) + 0.34^{*}\,(D*S)$, [Adj. R^2 =0.55]
(10.26) (0.14) (0.14) (11.47) (0.16) (0.17)

[Note * represents coefficients that are statistically significant at the 5% level or lower; figures in parentheses below each coefficient is its White heteroscedasticity-consistent robust standard error]

The values of the estimated coefficients in this equation suggest that income inequality *within* the agricultural sector is significantly lower in the Asian countries than in the Latin American countries, as indicated by the values of the constant terms (19.37 for the Asian countries and 42.34 for the Latin American countries)

Part C. Comparison between the Pooled OLS and the Fixed Effects Estimators

When we use the fixed effects estimator[37] to estimate the relation between income inequality and structural change, we get the following result[38] :

Gini = 50.65 - 0.14 Agr- 0.11 Ind
(9.05) (-1.52) (-0.91)

where figures in parentheses are t-statistics.

The main difference of these with the pooled ols results is that in this case (i.e. with fixed effects estimation) the coefficients of both independent variables (Shares of Agriculture and Industry) are statistically insignificant. However the signs of the coefficients in both cases remain the same.

A possible reason for this could be as follows. The fixed effects estimator is also called the within estimator as it uses only the variation in the data *within* each country group. This estimator of the slope coefficients simply discards *all* of the between-country variation in the data. In contrast, the pooled ols estimator gives equal weight to the within

[37] For a discussion on the procedure of Fixed effects estimation see the Statistical Appendix on Panel Data at the end of the thesis.
[38] The reason we do not use the random effects estimator is, the choice of the random effects model is ruled out by the Hausman specification test.

and between country information. For a discussion and proofs of these propositions see the Statistical Appendix on Panel Data.

We argue that in all probability, in our dataset, between-country variation in the variables is more prominent than within-country variation. Possibly the former is a more dominant factor than the latter and perhaps this is the most likely reason we get statistically significant coefficients with pooled ols estimation (and insignificant coefficients with fixed effects estimation) . There is support for this argument at two levels.

First, the economic variables we are dealing with, viz. income inequality and measures of structural change, are both known to change quite slowly over time within a country. This could be one reason why *a priori* within country variation in our dataset would tend to be low. In fact the results discussed by Li et al. (1998)[39] highlight one aspect of precisely this issue. These authors study closely the Deininger and Squire (1996a) dataset on income inequality and find that while inequality tends to change relatively slowly over time within a country, it tends to be quite different across country groups. According to them this is because, income inequality is affected by political economy factors and structural characteristics of individual economies[40] and these are quite slow to change over time. Even though we have only developing countries in our sample yet their structural characteristics are often quite different between these countries and at times this difference can be quite substantial. For instance, the Latin American countries differ in several respects from the Asian countries ; in fact, we incorporate a slope and an intercept dummy to control for these differences between these two country groups in our pooled ols regressions. Given these factors, it seems justified to expect between-country variation dominate the within country variation in our sample. In fact, given there are differences between individual countries, possibly this would be true for any cross-country dataset.

[39] This paper is reviewed at length in the main text in this chapter.
[40] However changes in the sectoral composition of output and employment are not explicitly included by these authors among their list of structural factors.

Second, results from cross-section regressions also seem to support our argument that there is substantial between-country variation in the data. As described in Part A of the Appendix, we have seven observations per country, each corresponding to averages over a 5-year period. We now report a few results from cross-section regressions, each run with average variable values for a 5-year period.

For each equation below we report, the t-statistics based on robust standard errors, adjusted R^2 and the number of observations in the dataset.

(i) For the period 1960-64 we get,

$$\underset{\quad(-6.29)\quad(-3.06)\qquad(-1.23)}{\text{Gini} = 75.44 - 0.72.\,\text{Agr} - 0.33.\,\text{Ind}},$$

Adjusted $R^2 = 0.58$; Nob:11

(ii) For the period 1970-74,

$$\underset{\quad(4.92)\quad(-3.17)\qquad(-1.12)}{\text{Gini} = 72.49 - 0.64.\,\text{Agr} - 0.40.\text{Ind}},$$

Adjusted $R^2 = 0.36$; Nob:16

(iii) For the period 1980-84,

$$\underset{\quad(10.88)\quad(5.58)\qquad(-1.99)}{\text{Gini} = 68.73 - 0.64.\,\text{Agr} - 0.36.\,\text{Ind}},$$

Adjusted $R^2 = 0.52$; Nob:15

The cross-section results reported above seem to provide some support to our argument regarding the existence of between-country variation in the data. At this juncture we would like to point out that there are pitfalls in drawing conclusions regarding the relation between income inequality and structural change purely on the basis of cross-country comparisons. However, our estimates are based on the pooled ols coeffcients, which make use of within country variation in the data as well. Further, to check whether or not the results we obtain from our pooled regressions, apply to change in the variables within

a country over time, we run the same regression using data from individual countries as well. It was not possible to estimate this relation for each one of the countries in our sample, mainly because of insufficient number of observations on Gini coefficients for most of them. We were able to estimate the relation for 3 of the countries (India, Pakistan and Indonesia), and the estimated equations in these 3 cases seem to reflect the results (particularly the signs of the coefficients) we get by pooling the data on all 18 countries. These equations are,

Indonesia :

$$\underset{}{\text{Gini}} = \underset{(7.29)}{47.08} - \underset{(-1.78)}{0.23\,\text{Agr}} - \underset{(-2.11)}{0.51.\text{Ind}},$$

Adjusted $R^2 = 0.25$; Nob : 9

Pakistan :

$$\underset{}{\text{Gini}} = \underset{(6.62)}{50.07} - \underset{(-2.67)}{0.16\,\text{Agr}} - \underset{(-2.07)}{0.84\,.\text{Ind}},$$

Adjusted $R^2 = 0.47$; Nob : 8

India :

$$\underset{}{\text{Gini}} = \underset{(4.18)}{59.94} - \underset{(-2.25)}{0.27\,\text{Agr}} - \underset{(-1.86)}{1.11\,\text{Ind}},$$

Adjusted $R^2 = 0.24$; Nob : 12

In view of these results it might seem surprising that the slope coefficients using the fixed effects estimation procedure were statistically insignificant. The most likely reason for this is that for most countries in the sample we have very few observations over time. As such, estimates based on simply the within-variation in the data use very little of the total information available in the dataset and are statistically insignificant.

In the final analysis we note that the results from the empirical analysis are at best only indicative of the nature of the relation between the process of structural change and income inequality. In fact, ultimately the economy-wide distribution of income is the

culmination of the entire gamut of economic activity undertaken by residents of a nation during a given time period.

Table 1A : Urban and Rural Gini Coefficients for Selected Developing Countries

Country	Year	Gini Coefficients	
		Rural	Urban
Bangladesh	1963	33.0	41.0
	1967	33.39	39.9
Brazil	1960	42.29	60.01
	1970	44.8	59.9
Chile	1968	39.45	44.0
China	1981*	23.9	16.1
	1982*	23.2	12.1
	1983*	24.6	15.8
	1984*	25.8	16.8
	1985*	26.4	15.8
	1990*	29.4	18.0
Colombia	1970	47.57	54.73
	1971	41.0	48.0
	1972	39.0	57.0
	1978*	52.6	51.6
Costa Rica	1961*	53.1	47.24
	1963*	42.36	37.06
	1971	37.0	44.0
	1982	39.78	41.52
	1984	40.55	48.37
India	1951	33.72	40.0
	1952	34.37	40.98
	1953	33.75	37.53
	1954	36.52	48.77
	1955	34.13	39.56
	1956	34.8	37.3
	1957	33.58	40.14
	1958	33.74	36.4
	1959	34.29	35.57
	1960	31.65	35.57
	1961	31.61	36.28
	1963	28.94	36.54
	1964	32.82	49.33
	1965*	39.71	35.57
	1966	30.13	34.51
	1967	29.69	34.69
	1968	29.08	34.5
	1969	30.97	34.25
	1970	28.76	34.69
	1972	30.67	34.7
	1978	30.92	34.71
	1983	30.10	34.08
	1987	30.22	36.75
	1988	30.14	35.57
	1989	29.51	34.8
	1990	28.23	35.59
	1991	29.91	37.98

Note :

- * indicates rural Gini coefficients exceed the urban Gini coefficients.

(cont'd)

Table 1 A (cont'd)

Country	Year	Gini Coefficients	
		Rural	Urban
Indonesia	1976	31.0	35.0
	1978	34.0	38.0
	1980	31.0	36.0
	1981	29.0	33.0
	1984	28.0	32.0
	1987	26.0	32.0
	1990	25.0	34.0
Malaysia	1958	34.84	35.1
	1968	42.36	52.09
	1969	42.03	51.33
	1970	47.29	51.2
	1971	41.94	49.69
	1972	43.41	49.22
	1973	43.58	48.44
	1974	43.19	48.85
	1975	45.78	49.10
	1976	47.58	49.65
Mexico	1963	48.23	52.38
Pakistan	1963	35.0	38.10
	1967	31.8	38.00
	1969	30.16	38.48
	1970	30.30	35.7
	1971	30.7	36.3
	1979	32.4	41.4
Peru	1971*	56.0	43
	1991*	37.1	35.3
	1994*	36.7	35
Philippines	1961	41.23	52.59
	1965	42.58	53.03
	1971*	46.59	45.80
Sri Lanka	1963	46.75	54.10
	1970	35.17	41.0
	1973	37.32	39.94
Thailand	1962	44.0	46.61
	1969	38.4	42.9
	1970*	44.8	38.52
	1971	42.0	44.0
	1976	40.6	41.2
Venezuela	1962*	45.2	43.85
Korean Republic	1965	28.52	41.67
	1966	30.56	32.29
	1970	29.45	34.55
	1971	31.0	33.81
	1976	32.73	41.18
	1982	30.61	37.05
	1985	29.69	36.94
	1988	28.95	34.96

Source : Deininger and Squire (1996a).

Note :

- indicates rural Gini coefficients exceed the urban Gini coefficients.

Table 2A : Details of Missing Observations on Gini Coefficients in the Final Data Set

Country	Description of Data on Gini Coefficients
BANGLADESH	There are 7 observations in all corresponding to each of the time periods 1960-64, 1965-69, 1970-74, 1975-79, 1980-84, 1985-89 and 1990-94.
BRAZIL	There are 6 observations in all. We have no data on Gini coefficients corresponding to the period, 1965-69.
CHILE	There are 5 observations in all. We have no data on Gini coefficients corresponding to the periods, 1960-64 and 1975-79.
CHINA	There are 6 observations in all. We have no data on Gini coefficients for the period 1965-69.
COLOMBIA	There are 4 observations in all. We have no data on Gini coefficients for the periods, 1960-64, 1965-69 and 1980-84.
COSTA RICA	There are 5 observations in all. We have no data on Gini coefficients for the periods, 1965-69 and 1990-94.
DOMINICAN REPUBLIC	There are 4 observations in all. We have no data on Gini coefficients for the periods, 1960-64, 1965-69 and 1970-74.
INDIA	There are 7 observations in all corresponding to each of the time periods 1960-64, 1965-69, 1970-74, 1975-79, 1980-84, 1985-89 and 1990-94.
INDONESIA	There are 7 observations in all corresponding to each of the time periods 1960-64, 1965-69, 1970-74, 1975-79, 1980-84, 1985-89 and 1990-94.
KOREA REPUBLIC	There are 7 observations in all corresponding to each of the time periods 1960-64, 1965-69, 1970-74, 1975-79, 1980-84, 1985-89 and 1990-94.
MALAYSIA	There are 4 observations in all. We have no data on Gini coefficients for the periods, 1960-64, 1965-69 and 1990-94.
MEXICO	There are 6 observations in all. We have no data on Gini coefficients for the period, 1970-74.
PAKISTAN	There are 6 observations in all. We have no data on Gini coefficients for the period, 1960-64.
PERU	There are 4 observations in all. We have no data on Gini coefficients for the periods, 1960-64, 1965-69 and 1975-79.
PHILIPPINES	There are 4 observations in all. We have no data on Gini coefficients for the period, 1980-84.
SRI LANKA	There are 7 observations in all corresponding to each of the time periods 1960-64, 1965-69, 1970-74, 1975-79, 1980-84, 1985-89 and 1990-94.
THAILAND	There are 7 observations in all corresponding to each of the time periods 1960-64, 1965-69, 1970-74, 1975-79, 1980-84, 1985-89 and 1990-94.
VENEZUELA	There are 5 observations in all. We have no data on Gini coefficients for the periods, 1960-64 and 1965-69.

Notes :

- The data on Gini coefficients are taken from the high quality data points in the Deininger and Squire (1996a) dataset. Whenever there are gaps in this dataset we refer to the more recent compilation of data on income inequality (UNDP, 1999) and select datapoints from there which are strictly comparable with and satisfy the same criteria as, the high quality data from Deininger and Squire (1996a). However as evident from the above table, there still remain a large number of missing observations in our final dataset. We list below the details regarding observaions chosen from the UNDP (1999).
- The observations pertaining to the following countries and to the following years are taken from UNDP (1999) : Brazil (1990, 1991); China (1964, 1970, 1978); Colombia (1993, 1994); Mexico (1994); Pakistan(1963); Philippines (1975); Sri Lanka (1969); and Thailand (1971).

Chapter 4

Sectoral Employment Shares, Relative Sectoral Labour Productivity and the Distribution of Income

Introduction Our discussion in the previous chapter was on changes in the inter-sectoral composition of total output, where this was our basic indicator of structural change, as we analysed how far this explains changes in the overall distribution of income in the context of developing economies. In Kuznets (1955), structural change essentially refers to the process of change in the sectoral employment structure or the occupational distribution of the labour force. From his analysis it appears that the transformation of an agrarian economy is accompanied by a movement of labour from the low-income, low-productivity agricultural sector to the higher-income and higher-productivity non-agricultural sectors. In the process of this transition, there is eventually a fall in the proportion of total population employed in the agricultural sector, and a corresponding rise in the proportion employed in the non-agricultural sectors. The historical development experience of most of today's developed economies seems to be have followed this pattern.

For Kuznets, the process of structural change essentially affects the overall distribution of income *because* of this change in the employment profile of the total income-earning population in the economy. Movement of labour from a sector with relatively low average income levels, to one where average incomes are higher, tends to exacerbate the extent of economy-wide inequality in the distribution of incomes. Kuznets (1955) does not discuss separately the impact of productivity change on the overall distribution of income. In fact, under certain conditions, in standard neo-classical analysis it can be shown that technological change does not affect the distribution of income in the economy. Consider, for instance, the case of identical, profit maximizing firms with Constant Elasticity of Substitution (CES) production functions. The functional form of the CES production function (attributed to Arrow et al., 1961) is,

$$Q = A\,[\delta.L^{-\rho} + (1-\delta).K^{-\rho}\,]^{-1/\rho}, \quad (A > 0;\ 0 < \delta < 1;\ -1 < \rho \neq 0),$$

where, Q represents total output and L and K are the two factors of production; A is the efficiency parameter indicating the state of the technology; δ is the distribution parameter, denoting relative factor shares in total product and ρ is the substitution parameter which determines the value of the elasticity of substitution.

With this production function, if factors are paid their marginal products (this can occur with perfect competition in the goods and factor markets), the share of each factor in total output remains unaffected by a change in the technology parameter[1]. That is, in this case the distribution of total income between the factors of production is unaffected by technological change. However this holds only under certain conditions, such as, e.g. perfectly competitive markets. We argue that in a real world situation, particularly in the context of developing countries, these conditions are violated and factors are not always paid according to their marginal products[2]. In this case a change in productivity levels does tend to influence the overall pattern of income distribution in the economy.

On the basis of data on a group of developing countries of Asia and Latin America (the same set studied in the previous chapter), we examine the available evidence on sectoral employment profiles. In essence, we try to ascertain the extent to which these countries' experiences with regard to change in personal income distributions can be understood in light of the change in sectoral employment structures and relative sectoral labour productivities. In this context, the main constraint we face relates to the available data on sectoral employment structures. Comparable and fairly reliable data on employment shares by economic sectors is available for all countries in our sample only from the 1980s. Thus, we can only cover a fraction of the entire period of analysis of the previous chapter, which stretched from the 1960s to the mid-1990s.

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[1] For instance, when labour receives its marginal product, the expression for the share of labour in total output $[(L.\ MP_L) / Q)]$ is independent of A (the technology parameter) : $(L.\ MP_L) / Q) = \delta / L.\ X$, where, $X = [\delta.L^{-\rho} + (1-\delta).K^{-\rho}]$. A symmetric expression can be derived for the share of capital in total output, which is also independent of 'A'.

[2] In particular, in the Lewisian dual economy model, factors in the traditional sector are paid their average products.

In what follows, we first describe the broad analytical framework used to discuss the relation between sectoral employment shares, relative sectoral labour productivity and income distribution (Section 1). We argue that in the context of developing economies, a movement of labour from the agricultural to the non-agricultural sectors is likely to leave the overall distribution of income relatively unaffected, where such labour movement is confined mainly within the informal segment of these sectors. Whereas, if technological progress occurs primarily in the industrial sector of the economy, it tends to raise the incomes of a small minority of mainly the skilled labour force and leaves relatively unaffected, the incomes of the vast majority of the poor. As such, this is likely to lead to a more uneven distribution of income. Next, we turn to available evidence from the developing countries, where we first study the trends in sectoral employment shares and then the data on relative sectoral labour productivities (Section 2). Here, we basically try to analyse, to what extent the actual change in the distribution of income in these economies can be understood in terms of changes in these two economic variables. We conclude this chapter with a discussion on the three aspects of structural change that are studied in this and in the previous chapters, viz. changes in sectoral output shares, in sectoral employment shares and in relative sectoral labour productivities. We sum up our findings regarding the relation between these variables and changes in the overall pattern of income distribution within developing economies (Section 3).

1 The Analytical Framework

In the discussion that follows, we lay out the broad framework within which we analyse the relation between change in employment shares, labour productivity and the distribution of income. First, we show that standard analyses of the Kuznets Curve, in general, tend to ignore the interrelations between labour productivity, and the overall distribution of income. It is recognised that change in the occupational distribution is an important factor affecting overall income distributions, but, we point out, there are certain issues that must be kept in mind in analysing the relation between these two economic variables. Secondly, we discuss how the relation between output structure and income inequality can be interpreted in terms of the occupational distribution of the workforce

and sectoral labour productivities. In particular we show that, *how* a change in output-structure affects inequality will essentially depend on whether this change is reflected in changing employment shares or is manifest in constant employment shares, with a change in labour productivity (for a discussion on related issues, see Kalecki, 1954 and 1971).

Income Inequality, Labour Productivity and the Occupational Distribution of the Workforce There is a vast literature that deals with the empirical validity of the Kuznets Curve, where this is essentially seen as a relation between income inequality and the level of per capita income[3]. Kuznets's explanation for this inequality-development relation runs in terms of a change in the occupational distribution of the total population. However, as we point out above, a change in labour productivity also affects the distribution of income. This can be most clearly brought out by the following decomposition of per capita income. Per capita income is a composite statistic which can be decomposed into the following three components (Bhaduri, 1993) : (a) the participation ratio, or the share of the economically active in the total population; (b) sectoral employment shares, or the occupational distribution of the active population; and (c) sectoral labour productivities.

It is definitionally true that sectoral labour productivities, weighted by the sectoral composition of the active population and adjusted for the participation ratio, yield the per capita income,

$$\text{i.e.,}\quad X/N = \{(X_a/L_a).(L_a/L) + (X_i/L_i).(L_i/L) + (X_s/L_s).(L_s/L)\}.(L/N)\,,$$

where, X represents aggregate output, N the total population and L the total labour force in the economy; L/N = Labour force participation ratio; X_a/L_a, X_i/L_i, X_s/L_s = average labour productivity in the agriculture, industry and service sectors respectively; L_a/L, L_i/L, L_s/L = share of the agriculture, industry and service sectors respectively, in total employment .

[3] For a critical analysis of this literature, see the discussion in Section 1.2 in the previous chapter.

For a given level of the participation ratio, therefore, change in per capita income levels can be explained by a combination of changes in the sectoral employment shares and in sectoral labour productivities . Also, with a given occupational distribution of the workforce and given levels of labour productivity, a change in the participation ratio would affect per capita income levels. As such, a relation between inequality and per capita incomes can also be interpreted in terms of these factors.

In this context, there are two sets of issues that have important implications for changes in the overall distribution of income. First, we point out that a change in labour productivity can affect the distribution of income, even in the absence of any inter-sectoral movement of labour. Second, apart from the *direction* of labour flow (i.e. whether labour moves from a high income to a low income sector or vice versa), the *composition* of the labour flow (in terms of its skill composition, for instance) has important implications for changes in the overall distribution of income. We discuss each of these issues in turn.

First, in explaining the relation between changes in per capita income levels and changes in income inequality, Kuznets (1955) essentially stresses the role of changes in the occupational distribution, while the role of changes in sectoral labour productivities receives relatively little attention. In this context, consider the following example of a two-sector economy, where the sectors A and B are the agricultural and non-agricultural sectors respectively. Per-capita incomes are assumed to be higher in B than in A. Now at time T_1 , say there is a certain distribution of income D_1 in this economy and the corresponding measure of income inequality (as measured by the Gini coefficient, say) is G_1 . Consider the distribution of income within the same economy at a later point in time T_2. We assume that the total population is absolutely stagnant and that between T_1 and T_2 there has been no movement of labour from A to B. However, industrial productivity is assumed to be higher at T_2 as compared to T_1 , while agricultural productivity remains unchanged over this period. Under these conditions, the gap between per capita incomes in the two sectors widens. As such economy-wide income inequality at T_2 , as measured

by G_2 (say) would actually tend to be higher than G_1 measured at T_1 . The tendency for inequality to increase due to change in industrial productivity would in fact be reinforced if the benefits of the productivity increase accrued to the profit- and rent-earners, rather than the wage-earners in the economy[4]. This example clearly illustrates how a change in the overall distribution of income can occur due to a change in productivity levels (brought about by technical change of some kind), even when there is no inter-sectoral movement of labour.

Second, we pointed out that it is important to focus on the *composition* of the labour flow in analysing its impact upon the overall distribution of income. In particular, there are two aspects of this, viz. (a) whether the 'entrant' labour force (or those being employed within a sector during the period of analysis) is moving between jobs or was previously unemployed ; and (b) the skill composition of the entrant workforce. We discuss the implications of each of these for the overall distribution of income.

In developing countries unemployment and underemployment is a stark reality, and typically it is still possible to increase output by increasing employment (the participation ratio rises in this case). Therefore an increase in the share of workers in a certain sector can also come about, not because some workers have been drawn into this sector from other sectors, but because some workers within this sector who were previously unemployed have now found work. We assume that unemployed workers earn zero income, as in most developing countries there is no system of unemployment dole. To sustain themselves therefore they were probably dependent on family income. When a previously unemployed worker gets a job, this would tend to make the distribution of income more equal as someone with previously zero income now receives at least a wage income. However, whether this will have any appreciable effect on *overall* income inequality would depend, *inter alia*, upon the *number* of unemployed workers getting

[4] Here we assume that, as compared to wage earners, a much smaller proportion of the entire population comprises of profit- and rent-earners. As such any factor that tends to increase the share of profits and rents relatively to that of wages, would exacerbate income inequality. This seems to be a reasonable assumption to make in the context of developing economies, where capital is relatively scarce (compared to labour) and the ownership of capital (both financial and physical, as well as land) tends to be extremely skewed.

jobs relative to the total pool of the unemployed, upon the *amount* of income he earns and how this compares with average incomes earned by the rest of the population, and so on.

In developing countries, the numbers of the openly unemployed is often quite small and it is the number of underemployed that is large, in comparison. We make the reasonable assumption that underemployed workers earn some of the lowest wages in the economy, such that their earnings may also be considered near zero. When such workers find other employment, this will affect income distribution directly via a wage effect just as in the case for unemployed workers. When an underemployed worker secures employment, this would tend to make the overall distribution more equal, as someone whose income was previously close to zero, now receives a wage income. In addition it would also affect income distribution indirectly via a productivity effect. For productivity would tend to increase in the sector in which there is a reduction in underemployment. How this affects overall inequality would depend upon, *inter alia*, how this affects relative sectoral productivities. For instance, if there is a fall in underemployment in the agricultural sector this could lead to an improvement in the overall distribution in a two-sector world, by narrowing the productivity gap between the agricultural and industrial sectors. Ultimately, how a fall in the extent of underemployment affects the overall distribution would depend upon the magnitudes involved, e.g., the proportion of underemployed workers securing employment, the increment in income such workers receive, the change in relative sectoral productivity (following the change in underemployment) and so on.

Now the income level of the worker, once he finds employment, will depend *inter alia,* upon his level of skill. Other things remaining constant, we argue that a skilled worker will join the workforce at higher wages than the unskilled workers. Thus the effect of an increase in the participation ratio (this may not involve a fall in the unemployment rate, as the rate of growth of the workforce would also affect this) on the distribution of income would depend, among other things, on the skill-composition of the newly employed workers. A larger proportion of skilled workers joining the workforce would imply that the new entrants would join the relatively high-wage segment of any industry. For a given distribution of income between wages and profits, this would tend to increase

wage inequality[5]. On the other hand if unskilled workers secure employment they tend to join the low-wage segment within any sector. This would tend to reduce the extent of income inequality in the economy if large numbers of the unskilled workers get employment. However if this number is relatively small, then overall inequality is unlikely to be affected very much as the income gap between the rich and the poor is unlikely to be affected very much if only a few (relatively) poor people get employment.

The Structure of Output, Employment Shares, Labour Productivity and Income Inequality In the previous chapter we showed that the relation between income inequality and per capita income levels could also be interpreted in terms of a change in the sectoral composition of aggregate output. We argued that this way of looking at the relation between structural change and income inequality brings into clear focus the *Kuznets process*, which refers to the process of industrial transformation of a primarily agrarian developing economy. We show below that any change in a sector's share in total output involves, either, a) a change in the share of employment of that sector in total employment ; or, b) a change in labour productivity in this sector relative to average labour productivity in the economy or c) a combination of these two factors. In what follows, we discuss how a change in output, brought about by a change in either of these variables, would tend to affect the overall distribution of income. We show that, the effect of a change in relative sectoral labour productivity on the overall distribution of income, is likely to be different from that of a change in the occupational distribution. This is because of certain structural features of developing economies, such as the existence of an informal sector, relative scarcity of capital and so on. We argue that under certain circumstances, a change in labour productivity in the industrial sector would tend to make the distribution of income less equal; while a change in the occupational distribution, involving a flow of labour from the agricultural to the non-agricultural sectors, might leave the overall distribution of income relatively unaffected.

[5] We assume that developing countries are relatively skill-scarce (for a discussion on this issue see Wood, 1994). A rise in the skilled workforce tends to add to the relatively small number of skilled wage earners and this tends to accentuate wage inequality within the economy.

A change in the share of output of any sector 'a' may be interpreted in the following way, given by the relation below,

$$X_a/X = \{(X_a/L_a) / (X/L)\}. (L_a/L) ,$$

where, X_a = Output of Sector 'a' , X = total output , L_a = Labour force employed in sector 'a' and L = total labour force.

This relation is essentially an identity and does not by itself reveal the nature of economic causation. Any change in (X_a/X) is associated with some combination of changes in, (i) $\{(X_a/L_a) / (X/L)\}$, which denotes sectoral labour productivity in sector 'a' relative to average labour productivity in the economy; and (ii) (L_a/L), which is the share of employment in sector 'a' in the total labour force. We can decompose a change in each sector's share in total output in this manner. We now discuss, how a change in each of the variables, relative sectoral labour productivity $[(X_a/L_a) / (X/L)]$ and in sectoral employment shares $[L_a /L]$, is likely to affect the overall distribution of income in the economy.

Labour Productivity and the Distribution of Income When labour productivity in a sector is higher than the national average, this seems to indicate that this sector is more advanced as compared to the rest of the economy in terms of technological standards achieved. Analogously, lower labour productivity in a given sector, relative to the national average, indicates its technological backwardness compared to other sectors in the economy. Now if labour productivity in a sector *rises* over time, relative to the national average, this indicates that technological progress in this sector is advancing at a faster pace as compared to the rest of the economy. Similarly a *decline* in relative sectoral labour productivity indicates that the pace of technological progress in this sector is slower as compared to the other sectors.

How a change in relative sectoral labour productivity would affect the overall distribution of income in the economy, depends upon several factors. First, technological progress

influences the distribution of income within the sector itself. Now, technical progress may be more or less evenly spread throughout the sector. In this case, if the distribution of the fruits of enhanced productivity remains unchanged, income inequality within the sector will be relatively unaffected. However, if the distribution of the total value added changes, this would affect income inequality within the sector. In particular, if the income-share of profit earners rises, income inequality can increase, even as technical progress occurs more or less evenly throughout the sector. Our basic assumption here is that in developing countries, capital (and other investible resources) is a scarce resource, whose ownership is concentrated among a relatively small proportion of the total population. In contrast the majority of the population in developing countries possess little assets other than their labour with which to earn a living. As such, wages account for the incomes of a much larger proportion of the total population. Thus, any increase in the share of profits relative to that of wages in total value added, would tend to make the distribution of income more uneven. Second, technical progress may affect some sectors more than the others and thus, affect the distribution of income between sectors. It seems plausible to argue that per capita income increases in a sector, where labour productivity increases relative to the national average. If this enhances the difference in per-capita incomes between this and the other sectors in the economy, *inter-sector* inequality rises, and this raises overall income inequality in the economy.

Occupational Distribution and Distribution of Income Changes in sectoral employment shares (or, the occupational distribution of the labour force) have several dimensions, some of which have an important bearing upon the overall distribution of income in the economy. These are considered within an analytical framework that stresses the roles of the formal and informal segments within each sector. We discussed the distinctions between the formal and informal sectors in Chapter 3. From the point of view of income distribution, the most important distinction between the two is that average wages tend to be higher in the formal as compared to the informal sector.

Essentially as a country develops, a greater part of its output and employment comes to be accounted for by the non-agricultural sectors. Industry and services are the two main

components of the non-agricultural sector and each of these have, in turn, a formal and an informal segment. Typically workers migrating from the agricultural sector have little skills, while formal sector jobs in the non-agricultural sector require trained workers. The agricultural sector in most developing nations tends to be marked by the phenomena of widespread poverty and landlessness. The poor own little land and have virtually no scope for investing in productive assets or in human capital formation (in this context see Banerjee and Newman, 1993). As such poor workers, especially those migrating from the rural sector, who have neither the resources nor the scope for training, tend to get absorbed primarily in the low-skill, low-value added segment of each sector. That is, we argue that workers who come into industry and service from the agricultural sector tend to find employment chiefly in the low-wage and often the informal segment of these sectors. In this context Cole and Sanders (1985) point out that the education and human capital requirement of the informal sector is low and this sector tends to have a lower capital-labour ratio as compared to the formal sectors. This makes it easier for unskilled rural workers to be absorbed in this labour-intensive sector.

There is ample empirical evidence that supports the view that the informal sector accounts for a sizeable proportion of the working population in developing countries and that its size has been growing through the eighties decade in a number of Asian and Latin American countries (see for instance, Agenor, 1996; Ihrig and Moe, 2000; ILO, 1998; Roberts, 1991; Rama, 1994; and Turnham, 1993). An important characteristic of recent experience in developing countries is that a large proportion of the labour force, particularly unskilled workers, is employed in the informal sector. In terms of numbers, the available data shows, a large proportion of the total labour force in urban areas are employed in the informal sector - 48% of urban workers in Thailand, 46% in Venezuela, 34% in Indonesia and 53% in Colombia are employed in the informal sector[6]. Agenor (1996) suggests that the share of the informal sector in total urban employment is sizeable in many developing countries, varying between 30% and 60%; while recent estimates by Ihrig and Moe (2000) suggest that on average as much as 60% of the workforce in

[6] The data on Thailand pertains to the year 1994, Venezuela to 1997, Colombia to 1996 and Indonesia to 1995 (ILO, 1998).

developing countries operate in the informal sector. In Mexico, for example, a large proportion of employment in non-agricultural sectors is found in small firms and micro-enterprises and in 1988 the informal sector accounted for about 50% of total urban employment (Roberts, 1991). In India, in the mid-1980s at least 3 out of 5 urban workers were involved in the informal sector (Agenor, 1996). According to Turnham (1993) the available data suggests an inverse relation between per capita income and size of informal sector. But even in upper middle-income developing countries the informal sector accounts for a sizeable part (at 30%) of total employment. Further, there is evidence suggesting that the size of the informal sector actually increased over the eighties decade. For instance, the share of the informal sector in Latin America rose from 40% in 1980, to 47% in 1985 and 55% in 1993.

There are two important aspects of how a transition of workers from the rural sector to the urban informal sector may affect the overall distribution of income. First, as the proportion of the poor increase in each of the industrial and service sectors (we are assuming that migration of workers from agriculture, essentially adds to the number of low-wage earners or the 'poor' in the non-agricultural sector), given that the number of high income earners or 'rich' remain relatively unchanged, inequality *within* each sector tends to increase. Intuitively it appears, that the effect of such a transition on the overall distribution of income would depend, *inter alia*, on the magnitude of the labour flow involved , and the size of the sector in terms of its share in total output and employment.

Second, in spite of the migration of workers from the agricultural to the non-agricultural sectors, essentially there could be little increase in the income share of the 'poor' or low-income classes as a whole in the economy. That is, basically we argue that, even though the (former) agricultural poor experience some increment in income after getting employment in the non-agricultural sector, essentially they still remain poor. In this context Marjit et al. (2000) argue that the urban informal sector wage is unlikely to deviate much from the rural wage given more or less unfettered mobility of labour between these two sectors. There is some evidence in support of this argument. In developing countries, most of the jobs created in the informal service sector tend to be

labour intensive, low-skilled, often part-time and earning low wages, with hourly wage rates that are about the lowest in the economy (ILO, 1998). So from an overall economic point of view the relative position of the rich vis a vis the poor in the economy may well remain unchanged and as such overall inequality in the economy would tend to show little change.

With this as our broad framework of analysis we examine the actual change in the occupational distribution and relative sectoral productivity that occurred in the developing countries in focus.

2 The Empirical Analysis

In this section we examine how the distribution of income changed, from the beginning of the 1980s decade till the early 1990s, in a group of developing economies of Asia and Latin America. We examine to what extent the observed changes in income distribution in these countries over this period can be understood in terms of changes in the inter-sectoral composition of aggregate output, the occupational distribution of employment and relative sectoral labour productivities (for details regarding the data, data sources etc. see the Appendix to this chapter).

The idea underlying our empirical analysis is the following. Essentially, personal income distribution is about the distribution of total incomes from all sources, earned by individuals or households in the economy, over a stipulated period of time (say a year). Dividing the entire economy into three sectors, such that sector-wise average or per-capita incomes can be clearly ranked, we try to obtain some notion regarding the extent of income inequality within each sector. Next we focus on the sectoral employment profile for the entire labour force (i.e. what proportion of the total workforce are employed in which sector). This will help to indicate the nature of the distribution of the income earning population across sectors and hence, give an idea regarding the nature of the overall distribution of income within the economy. The difference between the sectoral average incomes, and the proportions of the population employed in each sector,

together determine how unevenly total income is distributed in the economy. Also changes in the distribution of the workforce across sectors is likely to be a key determinant of changes in the overall distribution of income over time.

In what follows, we first examine how the distribution of income changed in the Asian and Latin American countries between 1980 and 1990. Then we see how economic structure changed over this period of time; essentially we try to analyse, to what extent this could have *caused* the observed changes in the distribution of income. A major constraint in this part of our analysis relates to the availability of data on the occupational distribution of the population, or employment shares by sectors, comparable across country groups. The employment data are from ILO (1999) and the starting point of this data set is 1980. As such, we are only able to focus on a period of ten years in this part of the study, covering approximately the period from 1980 to the beginning of the 1990s decade. Moreover, we are compelled to leave out two Latin American countries (Colombia and Peru) from our sample, as there is an urban bias in the data on sectoral employment shares for these countries. Details regarding data sources and problems with the employment data are discussed in the Appendix to this chapter. Even as we carry out this analysis based on the limited data available, we are careful to interpret our results with caution, keeping in mind the shortcomings on the data front.

Change in Income Inequality in Asia and Latin America For the Latin American countries, as we discussed in the previous chapter, the eighties decade has been referred to as the 'lost decade'. This was the period when the countries came to terms with the debt crisis and tried to bring into control endemic problems of runaway inflation and burgeoning external and internal deficits. We will discuss how these events are likely to have influenced the process of structural change and income distribution in these countries. But first, we note that between 1980 and 1990, there was a sharp increase in the degree of income inequality in the Latin American countries (Table 1). On average, inequality increased by almost 4 percentage points which is a very sharp increase indeed given the relatively short span of time that is considered in this study. For each of the Latin American countries considered (except Costa Rica, where income inequality

remained almost unchanged), income inequality increased by at least 3 percentage points or more over this period[7].

Table 1 : Change in Income Distribution in the Asian and Latin American Countries (1980-1990)

Country Groups	*Gini Coefficient*	
	1980	*1990*
Asia	40.71	40.25
Latin America	49.19	53.82

Source : Deininger and Squire (1996a) and UNDP (1999).

Note :

- For each country group the figures represent average values.
- For Latin America the averages exclude Colombia and Peru, as we do not have estimates of sectoral employment shares for these two countries. Thus, at each point in time, averages for Latin America represent six countries, Brazil, Chile, Costa Rica, Dominican Republic, Mexico and Venezuela,.
- For each period, for the Asian countries the figures are averages for ten countries, Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.

Income inequality in the Asian countries, on average, remained more or less unchanged over this period. However at a disaggregated level we find individual country experiences differ. On average, the Gini coefficient decreased marginally for the South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) – however as we mentioned in the previous chapter, this might reflect a change in the underlying methodology of calculating the Gini, especially for Bangladesh, Pakistan and Sri Lanka[8]. For the South-East Asian country group (Malaysia, Indonesia, Philippines and Thailand), the Gini remained virtually unchanged; while it increased significantly in China and declined in

[7] We exclude two Latin American countries, Colombia and Peru, from this part of the analysis, as the data on sectoral employment shares for these two countries pertain to the urban areas only. In this part of our study, we only include those countries for which reasonably reliable data on employment shares is also available. For, after all, here we are trying to relate changes in income inequality to changes in the occupational distribution of the workforce.

[8] E.g. in case of Bangladesh and Sri Lanka the Gini coefficients for 1990 denote expenditure rather than income inequality. As we mentioned earlier, typically expenditures tend to be more evenly distributed across households, than income. As such, the Gini estimating expenditure inequalities tends to be less than the Gini measuring income inequalities. We do adjust for these discrepancies in the data whenever possible, in line with the suggestions made in Deininger and Squire (1996) and Li et al. (1998). However, we note that such adjustment while reducing the bias may not eliminate it completely.

Korea. Therefore, except for China and Korea, in the other countries in our sample income inequality changed little over our period of analysis.

Structural Change in the Asian and Latin American Countries We now focus on the changes that occurred in the inter-sectoral composition of total output and employment for these countries. Here we focus on three dimensions of structural change, viz., the process of changes in the sectoral composition of aggregate output, the occupational distribution of the working population and in relative sectoral labour productivities.

The Asian Experience For the ten Asian countries we find that between 1980 and 1990, on average, the share of industry in total output increased very little (Table 2).

Table 2 : Changes in the Inter-Sectoral Composition of Output and Employment in the Asian Countries (%)

Sectors	*Output Shares*		*Employment Shares*	
	1980	*1990*	*1980*	*1990*
Agriculture	27.18	21.08	55.91	48.65
Industry	33.59	34.06	17.09	20.08
Services	39.23	44.86	26.15	30.63

Source : World Bank (2000) and ILO (1999).

Note :

- The output shares represent shares of value added in each sector as percentage of GDP.
- The employment shares represent shares of employment in each sector as percentage of total employment.
- For each period, the figures represent average values for ten countries, Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.

The share of agriculture declined, while there was a corresponding rise in the share of service in total output. According to our regression analysis on the relation between changes in the structure of output and overall income inequality, in the previous chapter, this should result in a rise in income inequality in the Asian economies. However, for this to actually hold, three conditions must be satisfied, viz. a) there is a movement of labour from agriculture to the services sector ; b) those moving out of the agricultural sector earn

more than what they were earning previously and c) the distribution of income within the service sector is more unequal than within agriculture. From the regression exercise in the previous chapter we have some evidence in support of the third condition regarding the pattern of income distribution within a sector. We now examine the actual picture regarding the inter-sectoral movement of labour within the Asian economies.

At the beginning of the 1980s decade, on average, over half the working population was employed in the agricultural sector in the Asian economies (Table 2). In terms of its share in total employment, the service and the industrial sectors followed agriculture. This picture was essentially unchanged by the middle of the 1990s decade. What did change is that by the middle of the 1990s decade, on average, agriculture accounted for less than half of total employment generated in these economies. However, the average figures reflect the reality for only half the Asian countries in our sample; for Bangladesh, India, Indonesia, Thailand and China more than half the total working population are still employed in the agricultural sector. Thus the basic change in the occupational distribution of the workforce over the 1980s decade in the Asian economies involves a fall in the share of agriculture, a small rise in the share of industry and a relatively larger rise in the share of services in total employment.

Relating changes in the occupational distribution with the changing composition of aggregate output, reveals rather an interesting feature of the process of structural change in the Asian economies. We note that the industrial sector's share in total value added changed very little between 1980 and 1990, even as its share in total employment increased. This seems to lend some support to the following argument. In the context of an agriculture-industry transition, Nayyar (1994) points out that, in the initial phases of structural change, the employment share of the industrial sector tends to increase more than its output share. It implies that this phase of development involves an expansion of employment opportunities in low-value added or relatively low productive activities. Such activities create employment, but owing to the low levels of productivity of the workers, do not add substantially to value added in the economy. In fact this also provides some indirect support to our argument that employment opportunities open up

mainly in the low value-added, low-wage segment of the industrial sector in many developing economies. Arguably this creates jobs mainly for low-skilled workers who are absorbed either from the pool of the unemployed or from even lower paid jobs in the agricultural and service sectors.

We showed above (Section 1) that a change in sectoral output shares can be decomposed into changes in sectoral employment shares and in relative sectoral labour productivities.

$$X_a/X = \{(X_a/L_a) / (X/L)\}. (L_a/L) ,$$

where, X_a = Output of Sector 'a' , X = total output , L_a = Labour force employed in sector 'a' and L = total labour force.

This relation is essentially an identity and should be interpreted as follows : the observed change in output shares is associated with some combination of changes in employment and/or in productivity. We now examine the nature of change in this variable for the Asian countries. At the beginning of the 1980s decade, the ranking of sectoral labour productivities, relative to the national average, is as follows (Table 3), it is lowest in agriculture and the highest in industry, with services in between.

Table 3 : Changes in Relative Sectoral Labour Productivities in the Asian Countries

Sectors	*Years*	
	1980	*1990*
Agriculture	0.49	0.46
Industry	2.14	1.79
Service	1.63	1.65

Source: ILO (1999) and World Bank (2000).

Note :

- *Relative sectoral labour productivity* is defined as follows : labour productivity in each sector (i.e. aggregate output by aggregate employment in each sector) divided by labour productivity in the economy as a whole (i.e. aggregate output by total employment for the whole economy). It is calculated by dividing the share of output of each sector in total output by its share in total workforce.
- For each period, the figures represent average values for ten countries, Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.

The ranking of the three sectors is unchanged in 1990. In terms of magnitude, the relative sectoral productivity in each sector appears lower than in 1980. This does not indicate that absolute labour productivity fell in each sector, for average labour productivity itself changed (increased) over this period. However, for our analysis it is more important to track changes in sectoral labour productivities *relative* to the national average. Basically from the data in Table 3 we can say that, in some sense, in the Asian economies average labour productivity and thus average wages are highest in industry followed by service and the lowest in agriculture. Finally, there is little change in this variable as compared to the change in sectoral employment shares over our period of analysis. As such, employers' decision to change output seems to have been followed by changes in employment rather than productivity. For, over this period when output shares changed substantially, employment shares changed more than did relative sectoral productivities.

The Latin American Experience The experience of the six Latin American countries, with respect to change in the structure of output over the 1980s decade, differs quite starkly from the Asian countries' experience in one respect. In the bulk of the countries included in our sample (Brazil, Chile, Costa Rica and Mexico), the share of industry in aggregate output actually declined, and this shows up in the average figures for the region as a whole (Table 4). This phenomenon is closely linked with these countries' experience with the debt crisis and the subsequent stabilisation and structural adjustment programs over this period. As we discussed in the previous chapter, policies adopted during this period aimed at restoring internal and external balance. As such, with their emphasis on cutbacks in government expenditure and drastic import compression, these policies tended to create a general atmosphere of economic recession across Latin America. Therefore, industry faced a squeeze from both the demand and supply sides, and industrial value-added failed to grow over this period. At the same time the secular decline in the share of agriculture continued, while the share of services in total output increased. The latter development is possibly related to the structural adjustment programs. We had argued that services act as a residual sector in these economies. With recessionary conditions in the economy and a shrinking industrial sector, the service sector, particularly the informal segment of the sector, would tend to absorb the bulk of

those who lose jobs or are unable to find employment elsewhere in the non-agricultural sector. This would tend to show up in the aggregate data as an expansion of the share of services in aggregate output and employment. In fact there is evidence that in the eighties decade the size of the informal sector grew in the Latin American economies. According to Turnham (1993), the share of the informal sector in Latin America rose from 40% in 1980, to 47% in 1985 and 55% in 1993. During 1983-89 employment in Latin America increased at an annual rate of about 3% (in line with economic growth) but a large proportion (almost 80%) of the new jobs were in the informal sector (own account workers, domestic service, micro-enterprises etc.). At the same time the share of the modern sector (medium and large private enterprises and the public sector) in total employment fell from about 60% in the early 1980s, to around 45% in 1993.

Table 4 : Changes in the Inter-Sectoral Composition of Output and Employment in the Latin American Countries (%)

Sectors	*Output Shares*		*Employment Shares*	
	1980	*1990*	*1980*	*1990*
Agriculture	11.51	9.63	24.42	20.33#
Industry	35.63	33.71	24.07	24.17
Services	52.87	56.67	46.57	55.3

Source : World Bank (2000) and ILO (1999).

Note :

- The output shares represent shares of value added in each sector as percentage of GDP.
- The employment shares represent shares of employment in each sector as percentage of total employment.
- For each year, the figures represent average values for six countries, Brazil, Chile, Costa Rica, Dominican Republic, Mexico and Venezuela.
- Data on Colombia and Peru are excluded for the following reasons. For Colombia, the sectoral employment data refer only to the urban areas, while for Peru, the data for the 1990s refer only to Lima and as such is not comparable with the figures for 1980.
- # For 1990, the agricultural employment data for Brazil excludes the rural population of Rondonia, Acre, Amazonas, Roraima, Para and Amapa. As such this figure tends to overestimate the fall in the share of agricultural employment in Latin America.

Regarding change in the occupational distribution of the workforce, there is a fall in the share of agriculture in total employment. However this average figure tends to overestimate the extent of fall in the share of agriculture in total workforce as in the

figure for 1990 for Brazil, a section of the rural areas (see Notes to Table 4) are not covered by these estimates. This tendency to under-report the share of the agricultural workforce for Brazil is naturally reflected in part in the average figure. The share of the industrial workforce in total employment remains almost stagnant, while that of service increases[9].

Studying relative sectoral labour productivities, we find that as in the Asian countries, relative to the national average, labour productivity is lowest in agriculture and highest in industry, with service in between (Table 5). However the difference between labour productivity between the agricultural and the non-agricultural sectors is less, on average, for the Latin American, than for the Asian countries.

Table 5 : Changes in Relative Sectoral Labour Productivities in the Latin American countries

Labour Productivity	*Years*	
	1980	*1990*
Agriculture	0.45	0.48
Industry	1.47	1.40
Service	1.27	1.04

Source : ILO (1999) and World Bank (2000).

Note :

- *Relative sectoral labour productivity* is defined as follows : labour productivity in each sector (i.e. aggregate output by aggregate employment in each sector) divided by labour productivity in the economy as a whole (i.e. aggregate output by total employment for the whole economy). It is calculated by dividing the share of output of each sector in total output by its share in total workforce.
- For each period, the figures represent average values for six countries, Brazil, Chile, Costa Rica, Dominican Republic, Mexico and Venezuela.

This picture remains unchanged in 1990 as well. There is a decline in magnitudes of relative sectoral labour productivity in industry and service, but the economy wide average labour productivity changed over this period as well. In fact, average labour productivity increased. However, for our analysis it is more important to track changes in

[9]In this case the rise in the employment share of the service sector does not match the fall in employment share in agriculture. This is because of a discrepancy in the data for Mexico, where the estimates for 1980 list nearly 30% of the total workforce as 'workers not classifiable by sectors'. For this period only 24% of the total workforce are reported to be in the service sector. For 1990 however all workers are classified by sectors and now over half the total workforce in Mexico appears to be in the service sector. This

sectoral labour productivities *relative* to the national average. Essentially we conclude as before that on average, wages tend to be highest in industry, followed by service and agriculture. Also as in the Asian economies, in terms of magnitude, the change in relative sectoral labour productivities was much less as compared to the change in sectoral employment shares. As such, in this case also the expansion in output seems to have resulted in increases in employment shares, while productivity changes appeared less important.

Before concluding this section, we point out briefly certain differences in the structural characteristics of the Asian and the Latin American countries (Tables 2 and 4). Regarding the share of each sector in aggregate output, in the Asian economies, on average agriculture accounted for at least a fifth of total output even in 1990. In contrast, at this time the agricultural sector accounted for less than a tenth of total output, on average, for the Latin American economies. Also, the service sector accounted for over half of total output in the Latin American economies on average, unlike in the Asian countries where the share was much less. Regarding the occupational distribution of the working population, in the Asian countries agriculture accounted for the largest share (over half in most of the Asian countries; Malaysia and Korea being the two exceptions) of the total workforce, followed by services. The industrial sector employed less than a fifth, and accounts for the smallest share of the total workforce. In the Latin American countries, by contrast, agriculture appeared far less important in terms of share in total workforce. The service sector was the most important in terms of share of employment in total workforce in the Latin American economies. Industry and agriculture were next in order of importance, each employing about a quarter of the total workforce. Thus, the basic difference between the Asian and the Latin American countries is that, on average we can classify the former still as predominantly agrarian economies, while the latter appear to be dominated by a service-based economy.

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discrepancy in the data for Mexico tends to overestimate the rise in the share of employment in the service sector over our period of analysis.

3 Conclusion

In this chapter we set out to explore, to what extent the relation between changes in income inequality and sectoral output shares, may be understood in terms of the underlying changes in sectoral employment shares and relative sectoral labour productivities. For both groups of countries we found that changes in sectoral employment shares were more important as compared to changes in relative sectoral labour productivities. That being the case, we then examined various aspects of changes in the employment shares with a view to analysing their implications for changes in the overall distribution of income. Our main results may be summarised as follows.

For the Asian countries the main phenomenon we sought to explain was relatively unchanging inequality even as the economies underwent structural change. Two sets of issues emerged from our analysis, as we identified certain forces at work, which could explain unchanging inequality in the face of inter-sectoral labour mobility. One relates to labour absorption in the low-value added and therefore, arguably, low-wage segment of the industrial sector. The second relates to the growing importance of the informal sector, especially informal services, in the bulk of the Asian nations in our sample. Movement of labour that was confined to the low-wage segment of the industrial sector, as well as labour movement within the informal sector, we argue, would create conditions, whereby overall inequality within the economy would be relatively unaffected. For these essentially constitute movement *within* the lower income classes that do *not* affect significantly, the gap between the richest and the poorest classes, which is what inequality is all about, at the end of the day.

However even in the Asian context, we realise that the informal sector explanation applies only to a subset of economies and that even then it cannot explain all of the change in inequality that occurred (or did not occur) in this subset. Clearly forces other than structural change are at work and in particular, the role of government policies is clearly indicated. For, in countries like China, we see a fairly sharp rise in inequality from the eighties, coinciding with a major change in the Chinese government's policy stance,

which especially served to dilute its redistributive role in a major way. The importance of government policies is also borne out by the low and steadily falling inequality in the Korean case, which no doubt is attributable, in large part to the Korean government's success with land reform policies. In fact the relative success of land reforms in the Asian countries as compared to the Latin American ones, could be one reason for the relatively lower inequality, on average, in the former countries as compared to the latter.

Regarding the Latin American countries, the sharp rise in inequality over the eighties decade in each of the countries in our sample, seems to be directly related to the debt crisis and the government's policy response to it. We argued that in an atmosphere of economic recession, income inequality is most likely to increase, as the poor and unskilled are likely to suffer greater fall in incomes than the rich, who may fall back on asset incomes as a form of insurance. In this situation, the informal sector may serve as a residual sector and absorb those who lose jobs, albeit at some of the lowest wages in the economy. There is evidence that shows that in Latin America the service sector, especially informal services played just such a role. Thus we argue that had it not been for the informal sector, income inequality would have worsened further in the Latin American economies.

In conclusion, regarding the relation between structural change and the distribution of income, we find only weak links between the two. In particular there is little support in the data for the Kuznetsian hypothesis of increasing inequality with the industrial transformation of a developing economy. However a particular structural characteristic of developing economies seems to have had an important bearing upon changes in the overall distribution of income. This relates to the role of the informal sector, which we have stressed time and again in our analyses above. In addition the importance of a number of other factors, in affecting the overall income distribution is also brought out. These relate to the role of exogenous shocks, such as the Latin American debt crisis and also to the importance of government policies - both long run (e.g. policies involving institutional changes, like land reforms) and short run (e.g. stabilisation policies aimed at restoring internal and external balance in the short- to medium-term).

Appendix

Sources of Data As before the data on income inequality are from the Deininger-Squire data set and WIID data set of the UNDP, and the data on shares on output are taken from the World Development Indicators 2000 (CD ROM) of the World Bank.

The data on sectoral employment shares are taken from the "1999 Key Indicators of the Labour Market (CD ROM)", published by the ILO (1999). Total employment is disaggregated into three broad classifications, agriculture, industry and service and employment in the three sectors is expressed as a percentage of total employment. The definitions of each sector follow the standard ISIC classifications. In particular, the agricultural sector comprises of activities in agriculture, hunting, forestry and fishing (in accordance with major division 1 of ISIC Revision 2 or categories A and B of ISIC Revision 3). The industry sector comprises mining and quarrying, manufacturing, construction and public utilities (electricity, gas and water) (in accordance with major divisions 2 to 5 of ISIC Revision 2 or categories C to F of ISIC Revision 3). The service sector consists of wholesale and retail trade, restaurants and hotels, transport, storage and communications, finance, insurance, real estate and business service, and community, social and personal service (this corresponds to major divisions 6 to 9 of ISIC Revision 2 or categories G to P of ISIC Revision 3).

We have sectoral employment data for eighteen countries of which ten are Asian (Bangladesh, China, India, Indonesia, Korean Republic, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand) and eight Latin American (Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Peru and Venezuela). The starting point of the data is 1980 and thereafter the next available data point is for 1990 for each of the countries in our sample. From 1990 onwards, annual data is available. But in our choice of data points in the post-1990 period we are constrained by the data on income inequality, which is available for most countries only for the early 1990s. Since we are choosing contemporaneous data points for each of the variables in focus, the end point of our period of analysis is set by the last date for which data on the Gini coefficient is available. As such in our final data

set we have two observations for each of the sixteen countries, one pertaining to 1980 (or the earliest year in the 1980s for which data on income distribution and sectoral employment shares is available) and the second pertaining to 1990 (or the latest year in the 1990s for which data on all the variables is available).

There are severe problems of comparability, both inter-temporal and across countries in the data on sectoral employment shares[10]. Mainly this is because the employment data are compiled from diverse sources and as such they often differ in coverage and scope. We choose the data keeping these limitations in mind. For example, for Peru, the employment data for 1980 refers to the whole country, whereas the data for 1990 only refers to Lima. As such the share of agricultural employment in 1990 appears to be only 0.4% of total employment as compared to 40% in 1980 ! We therefore drop the observation for Peru, as this does not depict the true picture regarding change in the occupational structure. For Colombia the data refers only to the urban areas, as such the share of agriculture in total employment appears abnormally low (1.4% in 1980 and 1.3% in 1991). As such we exclude Colombia from this part of our analysis as well.

[10] For instance, for Brazil the employment figure for 1980 refers to the whole of the country, whereas the data for 1990, excludes the rural populations of Rondonia, Acre, Amazonas, Roraima, Para and Amapa; for Indonesia the data refer to May, whereas for Pakistan the period covered in the survey is from July of the previous year to June.

Chapter 5

International Trade and Structural Change

Introduction In the two previous chapters, we examined how changes in the structure of the economy affect the overall distribution of income. We now ask the question, how does greater openness to international trade affect the process of structural change in the economy ? This will help us answer the basic question posed in this thesis, viz. how does greater openness to international trade affect the overall distribution of income within the economy ? We essentially attempt to test the broad hypothesis, that the process of structural change is the basic *channel* via which international trade affects the overall distribution of income in the context of developing economies.

In what follows, we first discuss a few issues related to the standard approach on the relation between international trade, structural change and the distribution of income (Section 1). Next, we describe our approach towards this dealing with this question and set out the analytical framework in detail (Section 2). We then turn to the empirical part of the analysis, and examine the data on our set of eighteen developing countries. We analyse the relation between international trade and structural change for these economies using a panel data set (Section 3). We conclude with a discussion on the main lessons that can be drawn from our empirical analysis regarding the relation between trade openness and the process of structural change within a developing economy (Section 4).

1 Analytical Framework

We now describe our framework of analysis. The basic question we ask is, as the *extent* of trade openness goes up and a developing economy engages in a greater volume of trade with the rest of the world, how does this affect the process of structural change within such economies. The reason this seems to be an interesting question is because with the current wave of globalisation sweeping across the world economy, it appears that greater outward orientation is inevitable. This might result due to countries adopting

trade liberalisation policies, or joining together to form free trade areas or joining the World Trade Organisation and accepting its obligations. Whatever the instrument of outward orientation, a rise in trade volumes would appear to be the inevitable outcome of such policy stance. Further, a number of forces are at work that have reduced costs, reduced uncertainty and greatly eased the flow of goods across international boundaries. In particular technological changes have led to falling costs of transportation while advance in information technology have greatly reduced uncertainty. Moreover the dominance of multinational corporations have contributed to a 'breakdown of the value chain', with parts of production processes being relocated in developing economies in order to take advantage of extremely low labour costs in these regions[1]. Often the bulk of such production is meant for re-export. As such this phenomenon has tended to affect directly the growth in world trade volumes. No doubt, the developments in transport and information technology have tended to reinforce this tendency. These are some of the reasons why we examine the likely consequences of countries engaging in a greater volume of trade.

In what follows we first point out that standard neo-classical analyses of the relation between international trade and income distribution are carried out within the Heckscher-Ohlin-Samuelson framework (Section 1.1). First we discuss why we do not use the HOS framework for our analysis. Next we point out that structural change is important even within this framework, which serves to underscore the importance of analysing the relation between trade and structural change in the first place. Then we present in detail our framework for analysing this issue (Section 1.2). Here we discuss the likely implications of changes in the commodity composition of imports and exports; and the consequences of changes in the total trade basket, in terms of the balance between imports and exports.

[1] In this context see Oxfam (2002) for several interesting case studies of how such relocation of production has affected local economic conditions in general and poverty and welfare levels in particular.

1.1 The Heckscher-Ohlin-Samuelson Framework : A Few Issues

In the following discussion we point out that standard neo-classical analyses of the relation between international trade and income distribution are carried out within the Heckscher-Ohlin-Samuelson (HOS) framework[2]. This theory explaining the basis of international trade is associated with the names of Heckscher (1949) and Ohlin (1933) and these ideas were formalised by Samuelson (1948 and 1949), whose papers on this subject are classics. However our analysis is *not* based on the HOS framework primarily because this has implications for *functional* income distributions, whereas we are interested in factors affecting the *personal* distribution of income. The other reason we do not use the HOS framework relates to the fact that trade *volumes* are not important within this framework whereas in this dissertation our objective is to study the distributional implications of a greater volume of trade[3]. Also, even the assumptions of the HOS model are far removed from the reality in developing countries. Nevertheless we show that within the standard HOS framework, structural change is an important part of the process linking changes in trade and relative factor incomes[4]. Therefore as we relate trade and structural change in effect we are studying an important way in which trade affects income distribution in standard trade theoretic framework.

Issues relating to trade between developed and developing nations, in general, tend to be discussed within the framework of the HOS theory of international trade (see, for instance, Wood, 1994)[5]. The main point in the HOS theorem is that, a country's trade pattern (i.e. which goods are exported and which goods are imported) can be explained by its endowment of the resources that are used in the process of production. Consider the

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[2] Here it may be pointed out that traditional trade theories, such as the HOS theory assume that it is differences between countries (e.g., differences w.r.t. factor endowments) that is the prime cause of international trade. However, there is another body of literature, also known as "new trade theory", which recognises that such differences are one reason for trade, but it also incorporates another aspect, viz., countries may trade because there are inherent advantages to specialisation. According to this theory technological change is a key factor driving international specialisation. Essentially new trade theory emphasizes the role of increasing returns and imperfect competition, which traditional trade theory ignores (see for instance, Helpman and Krugman, 1985 and 1989; Krugman, 1986 and 1990).

[3] In this context Krugman (2000) underscores the importance of analysing trade volumes.

[4] We show that many empirical analyses based on the HOS model tend to ignore this aspect, as they focus on changes in relative prices and relative factor incomes.

[5] For details see the discussion in Section 1.3, in Chapter 2.

two country -two factor - two commodities, version of the HOS theorem, where labour and capital are the two factors of production. The theorem states, that under certain conditions[6] a relatively labour-abundant country specialises in the production and export of the relatively labour-intensive commodity and imports the relatively capital-intensive commodity. Conversely, a relatively capital-abundant country specialises in the production and export of the relatively capital-intensive commodity and imports the labour-intensive commodity. The Stolper-Samuelson (SS) Theorem, an important corollary of the HOS theorem, spells out the distributional impact of a change in trade policy regimes (see Stolper and Samuelson, 1941). According to the SS theorem, an increase in tariff protection on imports tends to raise the real returns to the relatively scarce factor of production and to reduce the returns to the relatively abundant factor. Analogously, after a country liberalises trade by reducing tariffs on imports, the returns to the relatively abundant factor of production rises and returns to the relatively scarce factor declines in real terms. Essentially within the HOS framework changes in trade policy regime are clearly related to changes in returns to factors of production. That is, this framework relates international trade and the functional distribution of income. In this dissertation however, we are interested in studying some of the factors affecting personal income distributions. This is one of the primary reasons we do not use the HOS framework directly for our analysis.

Our objective in this dissertation is to study the distributional implications of a greater volume of international trade. However, in the HOS model the *volume* of trade by itself does not play any role. Within this framework, the effect of international trade on economic structure, on returns to factors work out via a change in relative prices. However, "trade volumes are *not* irrelevant" [see Krugman (2000), page 52]. In reality, often there can be a change in trade volumes, without a change in relative prices. For instance, when a country becomes the member of a trade bloc, or when quantitative restrictions on exports are lifted (e.g., many countries ban trade in agricultural products), trade volumes increase even at the existing configurations of relative prices. In this case,

[6] Such as perfect competition in goods and factor markets, constant returns to scale technology, full employment of factors of production and identical technical knowledge across nations.

particularly if there is an increase in production for exports, this can potentially alter the sectoral composition of aggregate output and employment and affect the overall distribution of income.

At this juncture we would like to mention another point which relates to the use of the HOS model in analysing economic issues pertaining to developing countries. We do not think the HOS framework is entirely appropriate for developing economies, primarily because a number of assumptions underlying HOS theory are not in keeping with the reality characterising such economies. For instance, the assumptions of full employment of resources, perfect mobility of resources between alternative uses, constant returns to scale, identical production functions across trading nations, would appear quite unsuitable in the context of developing economies characterised by structural rigidities and unemployment and underemployment of labour[7].

Finally it is important to realise that in the HOS model, international trade affects the structure of production and employment in the economy, and this is the basic reason it affects the distribution of income. The channel via which these changes occur is the relative prices of goods and factors of production. In the HOS framework when a country opens up to international trade the main change that takes place is a change in the price of the exportable relative to that of the importable good. By assumption, the exportable good can be produced relatively cheaply within the country as compared to the rest of the world and its price is lower in autarky than in the post-trade situation. Conversely, the domestic price of importables tends to be higher than the world market price, as the rest of the world has a cost advantage in the production of these goods. As such, in the post-trade situation when world prices prevail within the economy, the domestic price of exportables rises and that of importables falls, as compared to autarky. In response to this price change, profit-maximising firms adjust output and employment and move to a new equilibrium situation (for the old equilibrium levels of output and employment are no

[7] However it is not as though the kinds of effects predicted by HOS theory do not occur at all. In the context of labour-abundant developing countries, an expansion of labour intensive exports might lead to an increase in the share of labour in aggregate income. This would happen, for instance, when the expansion

longer optimal under the new relative price configuration). The process of firms adjusting to a new equilibrium in the post-trade situation is manifested in a change in the structure of output and employment - this is essentially the 'structural change' associated with international trade[8]. Therefore, as we explore the relation between trade and structural change, in essence we are examining an important channel via which trade affects distribution in the standard neo-classical framework.

2.2 International Trade and Structural Change

Our basic analytical framework is based on a simple idea. Following a change in the trade policy regime, there is a change in the volume of imports and exports. This tends to affect the structure of output and employment in the economy. It may do so directly, via a change in the production of tradable. Or indirectly, via a change in the structure of demand, that in turn affects output and employment. There are several factors that determine the nature of the impact of a change in the tradable sector upon the structure of output and employment. To bring out this point clearly consider the example below.

Following the adoption of trade liberalisation policies, say there is an expansion of exports. This can happen in any one of two ways – either via an increase in production levels of the exportable good, or at unchanged levels of production, via reduced sales of this good in the domestic market. In the second case the sectoral composition of the traded goods (or tradable) sector is not affected. In the first case however, the increase in production does tend to affect overall economic structure; exactly how it would do so depends on a number of issues. If, for instance, the increase in production for exports

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of production for exports results in the creation of employment, even when employment increases without an increase in the wage rate, in the presence of surplus labour.

[8] However this point is often overlooked, and analyses of the relation between trade and income distribution, based on the HOS framework, generally concentrate on trends in relative prices. Such studies (see for instance, Lawrence and Slaughter, 1993; Sachs and Shatz, 1994) *assume* that once relative prices change, the kind of structural change predicted by the HOS theory will work itself out. As such, these authors focus on relative price changes and try to relate this to change in factor incomes, ignoring the intermediate step of structural change. Thereby the role of structural rigidities is completely ignored in these studies. For instance, one form of such rigidity may involve impediments to mobility of factors of production and this could be particularly relevant in the context of developing countries.

consists mainly of manufactured goods, *ceteris paribus,* this would tend to increase the weight of the industrial component within the traded-goods sector. Since the increase in demand is met out of additional production, *ceteris paribus*, the share of industry in total output would also go up. This is the first round impact of such an increase in exports upon the overall economic structure – in this case, *ceteris paribus*, there is a tendency for an expansion in exports to increase the share of industry in total output. The second round impact of trade on the sectoral composition of output, will depend upon the impact of the rise in the share of industrial output upon aggregate employment and on aggregate demand. In our example, if the increase in production for exports also results in an increase in employment in the industrial sector, this will have an impact on aggregate demand, particularly consumption demand. How this increase in demand affects the composition of total output, will in turn depend upon the composition of this additional demand, in terms of (a) demand for goods produced in the home country and demand for imports and (b) the sectoral composition of demand for goods produced within the country. Further, another issue that is likely to matter, particularly from the point of view of the composition of demand is, how the expansion of production for exports actually comes about? In particular, does it occur mainly via an increase in productivity levels rather than employment levels ? Or does it come about from the exploitation of hitherto underutilised capacity ? For instance, with the expansion of exports coming about via higher levels of productivity, the composition of additional demand due to this is likely to be different from the case when expansion of production comes about via an expansion of employment alone. Increased productivity is likely to translate into higher wages or higher profits or some combination of the two. The commodity composition of consumption out of an increment in wages or profits of those already employed, is likely to be different from that of consumption out of wages of the newly employed (especially if those newly employed were unemployed before). Another issue that has a bearing on this is the nature of the good that is being exported, i.e. whether or not it belongs to the high technology-high wage category of the manufacturing sector. For, once again, the composition of demand from higher wages and presumably higher profits is likely to be different from that out of lower levels of income. For instance, such demand might have a high import content.

The above discussion indicates that in reality, the impact of a change in the extent of openness upon the commodity composition of GDP, depends upon a complex interplay of factors. However, we attempt to isolate certain factors that play a key role in this context and discuss below how these might affect the overall structure of the economy. In particular, there are two sets of factors that we focus on, viz., the *commodity-composition* of exportables and importables (in terms of producer goods and consumer goods, and agricultural and non-agricultural goods); and the *composition* of the total trade basket in terms of exports and imports. We examine how these change, following greater openness to international trade flows and analyse the likely implications of these changes for the process of structural change.

Changes in the Commodity-Composition of Imports and Exports In what follows, we first discuss the role of imports, followed by that of exports.

Role of Imports There are three issues in particular which should be taken into account in considering the impact of a greater volume of imports upon the structure of production within the domestic economy. They are : (a) the *use* these imports are put to, i.e., whether they are used for final consumption or they are used as inputs into the overall production process in the economy ; (b) whether or not imports are *substitutes* for domestically produced goods (i.e. whether imports *compete* with domestically produced goods or whether they are *non-competing*) and (c) the *composition* of the imports basket with respect to agricultural and non-agricultural goods. We discuss the implications of each of these in turn.

Consider first, how the end-use of imported goods make a difference to the overall production structure. Imported raw materials affect the production process directly. They tend to boost the domestic production of goods for which these enter as inputs in the production process. The net effect of such imports will be to boost aggregate output, given they are not replacing domestically produced raw materials in the production process. In case of imported final goods, these affect the structure of production only indirectly, when expenditure on such goods is diverted from that on domestically

produced goods. In this case, the production of such domestic goods might get affected, which in turn would affect aggregate output and employment.

Second, to the extent imports tend to replace domestic goods in total consumption, there is a tendency for domestic production of importables to fall. In particular, if imports of manufactures out-compete domestically produced manufactures, this can adversely affect the total output of the manufacturing sector. The first round impact would be a reduction of output of the import competing good; but this effect could be further compounded by second-round multiplier effects, operating through a reduction in the output of raw materials and other linked commodities.

Third, the composition of the imports basket with respect to agricultural goods and non-agricultural goods, is also important for determining the impact of a greater volume of imports on the structure of output. For instance, if the bulk of imports are of non-agricultural goods and if most of it consists of raw materials or other necessary inputs, this tends to have a positive impact on the production levels of the non-agricultural sector in the economy. This would in turn tend to reinforce the process of industrial transformation of an agrarian economy. Essentially there are two important points to consider. First, the composition of the imports basket into agricultural and non-agricultural goods would affect the sectoral composition of aggregate output in the economy. Second, the nature of this effect would depend upon the composition of the imported goods in terms of consumption or production goods and on whether or not these are competing to replace domestically produced goods in a certain use.

Ultimately, regarding imports and the process of structural change, we can say the following. In countries that follow a path of ISI (Import Substituting Industrialisation), in general, a large proportion of imports consists of raw materials and other essential items required by domestic industry. As a matter of policy the government regulates the flow of imports in order to ensure this, and typically, imports of a number of consumer goods (especially those considered 'luxury' or inessential goods) are banned. This changes, however, when policies of import liberalisation are put in place. After controls on imports

are dismantled, the import-content of domestic consumption tends to rise and country experiences indicate that import of consumer goods increase. Thus we would expect a distinct change in the role of imports in the pre- and post-trade liberalisation phases. While, in the pre-liberalisation phase, imports would tend to reinforce the process of industrialisation in developing countries; in the post-liberalisation period they may well lead to some de-industrialisation.

Role of Exports We now discuss the likely impact of a greater volume of exports. In case of a pure export good (one which is not consumed at all in the domestic market or whose domestic consumption is only a negligibly small share of total production), expansion of exports will always have an expansionary impact on total production. However, in case of a good that is consumed in both the domestic and the world markets, exports may not always add to total production; for often, exports may come out of reduced domestic sales of the good. The composition of exports in terms of end-use (i.e. whether the goods exported are used for production or final consumption), really does not affect the structure of production in the domestic economy, even as it does tend to affect the value of these goods. For instance, when the goods exported are intermediates, these are sold to the final consumers after greater value addition. The exporters of the intermediates naturally do not receive a share of this higher value added. In other words, typically the exports of intermediates involve lower value added products than that of final goods.

Essentially, what matters from the point of view of the structure of production in the domestic economy, is the composition of the export basket in terms of agricultural and non-agricultural goods. Typically developing countries tend to have a natural comparative advantage in the production and exports of agricultural goods and other natural resource based primary products. However, there is a literature in the tradition of Singer (1950) and Prebisch (1959) which points out that dependence on primary exports can actually lead to a deterioration in these countries' long run terms of trade[9]. Further, it

[9] However, Singer and Sarkar (1991) point out that reliance on manufactured exports may not be the solution for developing nations, so far as terms of trade considerations are concerned. They record a deterioration of developing countries' factoral terms of trade vis a vis developed countries over the period

is realised that with dependence on exports of primary commodities, these counties can never hope to 'catch up' with the industrialised nations. In fact, the goal of all developing nations is to achieve a sound industrial base. Some try to achieve this on the basis of the domestic market, protecting domestic firms from foreign competition by erecting barriers that prevent the entry of foreign goods. Many large countries, (e.g., India and Brazil) adopted such strategies. Yet other countries rely on exports as the way to industrialisation. They adopt, what is termed as a strategy of 'export-led' growth. For such countries, exports affect the process of industrialisation directly by promoting the growth of manufacturing units geared towards producing for the world market. Countries that do not have a large domestic market tend to go in for such policies[10]. In fact the smallness of the domestic market, in many cases compel countries to choose the path of export-led industrialisation. Exports act as a catalyst in the process of industrial transformation of the economy for such countries.

From the above discussion it is apparent that the composition of exports in terms of agricultural and non-agricultural goods has important implications for the value of the goods exported and more importantly, from our point of view, for the structure of production in the economy.

Change in the Composition of the Total Trade Basket We now consider the impact of a change in the composition of the total trade basket, in terms of exports and imports, upon the structure of production within the economy.

Consider the simple National Income Identity,

1965-1985 when a number of developing countries were exporters of manufactured goods. Over this period the commodity composition of exports of developing countries had undergone a major change with dominance of manufactures in their non-fuel exports and with strong growth in the volume of manufactured exports. However Singer et al. show that even this did not allow developing countries to escape unequal exchange relations with developed nations. In this context we'd like to stress that this is an important issue but it is not directly related to our analysis which focuses on the distribution of income *within* a developing country and not on exchange relations between developed and developing countries.

[10]The East Asian economies of Hong Kong, Korea, Taiwan and Singapore achieved spectacular success by adopting such policies. For a detailed discussion on the experience of the East Asian Tigers see Amsden, (1989) and World Bank (1993).

$$Y = C + I + G + (X - M),$$

where Y = Aggregate Output, C = Total Consumption Expenditure, I = Total Investment Expenditure, G = Total Government Expenditure, X = Total Exports and M = Total Imports.

This clearly indicates the simple fact that exports constitute an addition and imports a leakage from the aggregate demand stream. The net impact of trade upon aggregate demand is therefore determined by whether net exports (X – M) are positive or negative.

With greater openness to international trade flows, exports and imports both change, but not necessarily at the same pace. With greater openness, imports grow in response to a change in consumption demand. This tends to take less time than a change in the levels of exports, which requires a change in production levels. Therefore, typically after a country reduces barriers to trade, its imports, particularly of consumption goods, tend to go up first, creating a trade deficit (or widening an existing deficit), while exports pick up with some time lag. In the short run, then, trade liberalisation could dampen aggregate demand and through the multiplier effect lead to a further contraction in output and employment (in this context see Nayyar, 1997). The impact of a widening trade deficit upon the structure of production is essentially determined by the nature of the composition of the import and exports baskets, in line with the discussion above. In the final analysis, the impact of a trade deficit upon the structure of production will depend essentially upon two things, (a) the composition of the imports and exports basket and (b) the rate of growth of exports vis a vis imports, following greater openness to international trade.

We conclude this discussion by observing that apart from international trade, the other main factor that affects the process of structural change in the economy is the level and the composition of aggregate domestic demand. In our regression analysis we control for both, the size of the domestic market (as measured by total domestic absorption) and also income levels (as measured by per capita incomes) as we analyse how trade affects the structure of the economy.

2 Empirical Analysis

We analyse three specific issues on the basis of data on the eighteen developing countries of Asia (Bangladesh, China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand) and Latin America (Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela). First, we analyse the data on structural change and trade openness, in order to highlight broad similarities and apparent differences in respect of these variables between the two country groups (Section 3.1). Then we estimate an econometric model based on panel data, to examine the nature of the relation between the extent of trade openness and structural change for these countries (Section 3.2)[11]. Finally, using the limited data we have on the composition of these countries' exports and imports we analyse how a change in the composition of the trade basket affects the overall process of structural change in these economies (Section 3.4).

Before proceeding further we would like to discuss a few issues regarding the measure of trade openness used for the empirical analysis. In this dissertation our objective is to study how a greater *volume* of trade affects the process of structural change and via this channel, the distribution of income within a developing economy. As such we use the trade-GDP ratio (exports plus imports expressed as a percentage of GDP) as our measure of trade openness as it directly captures the impact of a change in trade volumes. This is one of the simplest and most direct (outcome-based) measures of trade openness, which has been used in a number of studies, especially in the endogenous growth literature (see for instance, Romer, 1989 and Quah and Rauch, 1990). The trade-GDP ratio has a number of shortcomings as a measure of trade openness, widely discussed in the literature (see Edwards, 1993; Harrison, 1996; Oxfam, 2002; Pritchett, 1988; and Rodriguez and Rodrik, 2002). Nevertheless we still use it for our empirical analysis as it appears to be the most appropriate measure, given the nature our analysis – change in the trade-GDP ratio over time, is the most direct measure of a change in trade volumes. A

[11] Here structural change essentially refers to changes in the sectoral composition of aggregate output. Since we have extremely limited data on employment shares, we do not focus on this variable in this part of our analysis. Since we have time series data on both, the openness variable and on sectoral output shares

number of alternative measures of trade openness and trade policy orientation are also available in the literature (see for instance, Dollar, 1992; Lawrence, 1991; Leamer, 1988; Oxfam, 2002; Sachs and Warner, 1995; Spilimbergo, 1999; Wacziarg, 1998; and so on)[12]. However these have also been widely criticised for having a number of shortcomings (see Pritchett, 1988; Harrison, 1996; and Rodriguez and Rodrik, 2002). Ultimately it is upon the researcher to choose a measure of trade openness that seems best suited to the problem at hand.

3.1 Characteristics of the Asian and Latin American Countries We first examine the data relating to change in the sectoral composition of aggregate output and in the degree of openness to international trade for the eighteen developing countries of Asia and Latin America. Our period of analysis is from 1960 to 1998, the latest year in the 1990s for which data is available. We use the shares of the agriculture, industry and service sectors in total output as the variables indicating the extent of structural change in the economy. Regarding the measure of trade openness, we use the simplest measure available, viz., the trade shares ratio, which is the total volume of trade (i.e. the sum of exports and imports) expressed as a percentage of total GDP. This measure is chosen as it is the most suitable one available from our point our view. It gives a measure of the *volume* of international trade which as we argued above, is important from the point of view of the impact of trade on structural change in the economy.

We first turn to the data on openness and the sectoral composition of aggregate output, and attempt to analyse the main changes in these two variables, in the Latin American and Asian economies, over our period of analysis. Tables 1 and 2 (below) give some idea regarding the sheer magnitude of change in these variables between the beginning and end points of the period. We see that between 1960 and 1998, the share of agriculture in

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for all the countries in our sample, we study the relation between these two variables in our econometric exercise.

[12] *Inter alia*, these measures primarily focus on the following two sets of issues : *first*, how does international trade affect economic outcomes directly via a greater flow of imports and exports ; and *second*, insofar as trade policies also remove domestic distortions, a number of measures attempt to capture how trade liberalisation affects economic outcomes indirectly via this channel.

GDP declined in both Asia and Latin America, but in terms of magnitude, there was sharper decline in the Asian than in the Latin American countries.

Table 1 : Changes in Economic Structure and Trade Openness in the Asian Countries from 1960 to 1998 (%GDP)

	1960	*1998*
Agriculture	37	18
Industry	21	36
Services	42	46
Trade Openness	37	82

Source : World Bank (2000).

Note :

- Agriculture, Industry and Services, each represent the shares of value added in these sectors as a percentage of GDP.
- Trade Openness represents the sum of exports and imports, as a percentage of GDP.
- For each variable and for each year, the figures represent unweighted averages across the following ten countries : Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.

However, both at the beginning and at the end of the period, the agricultural sector still accounted for a higher share of output in the Asian economies. The share of the industrial sector was substantially higher in the Latin American countries in the 1960s than in the Asian nations. But, it appears there was a slowdown in the process of industrialisation in the Latin American countries towards the end of our period of analysis. For, the share of industry in 1998 is actually lower than its level in 1960. Further, the share of industry in the Latin American countries had actually fallen below the Asian average by the end of the period.

Table 2 : Changes in Economic Structure and Trade Openness in the Latin American Countries from 1960 to 1998 (%GDP)

	1960	*1998*
Agriculture	16	9
Industry	33	30
Services	51	61
Trade Openness	34	51

Source : World Bank (2000).

Note :

- Agriculture, Industry and Services, each represent the shares of value added in these sectors as a percentage of GDP.
- Trade Openness represents the sum of exports and imports, as a percentage of GDP.
- For each variable the figures represent unweighted averages across countries for each year indicated.
- For 1960, the average figures for the (percentage) shares of value added in each sector, does not include does not include data on Colombia, Dominican Republic and Mexico, as these data points were missing.

The service sector grew in importance in both country groups, though services still remained more important, in terms of its share in aggregate output, in the Latin American, than in the Asian countries. As for the countries' openness to international trade, as measured by the trade shares ratio (exports plus imports expressed as a percentage of GDP), this increased dramatically in both groups of countries, but in particular it increased more dramatically for the Asian than for the Latin American countries. For the Asian economies, the extent of openness increased most dramatically for the South-East Asian nations of Indonesia, Korea, Malaysia, Philippines and Thailand and also for China. But, for China and the South Asian nations of India, Bangladesh and Pakistan, the trade shares ratio still averaged below 40% of GDP.

To get a better picture of how these variables changed through the three decades under study, we see how their values changed over each of the decades, for each of the country groups, below.

The Asian Economies In the Asian economies, on average, the share of agriculture declined throughout our period of analysis, though the sharpest decline came about between 1975 and 1980 (Table 3 below).

Table 3 : Changes in Economic Structure in the Asian Countries from 1960 to 1998 (% GDP)

	1960	*1965*	*1970*	*1975*	*1980*	*1985*	*1990*	*1995*	*1998*
Agriculture	37	37	34	32	27	24	22	19	18
Industry	21	23	25	29	34	32	34	35	36
Services	42	41	41	38	39	43	44	46	46

Source : World Bank (2000)

Note :

- Agriculture, Industry and Services, each represent the shares of value added in these sectors as a percentage of GDP.
- For each variable and for each year, the figures represent unweighted averages across the following ten countries : Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.

This period also witnessed the sharpest rise in the share of industry in total output, while the share of the service sector changed little. In comparison, between 1980 and 1985 the

share of industry decreased a little, to pick up in the latter half of the decade. Thereafter the shares of industry and services seem to have stabilised in the 1990s decade.

Up to 1970, the trade shares ratio declined a little, mainly owing to a slight decline in the share of exports in GDP, while the imports share remained more or less unchanged (Table 4 below). The trade shares ratio increased sharply between 1970 and 1980, with both the imports and exports share increasing more between 1975 and 1980. The countries where the share of exports increased the most between 1970 and 1980 were, Indonesia, Malaysia, Thailand and Korea – in all these countries the share of exports in GDP increased by at least 10 percentage points over this period. The increase in imports share was much more evenly spread across countries, increasing by 5 percentage points even for the South Asian nation Bangladesh that experienced the least increase in trade shares over this period.

Table 4 : Changes in Trade Openness in the Asian Countries from 1960 to 1998 (% GDP)

	1960	*1965*	*1970*	*1975*	*1980*	*1985*	*1990*	*1995*	*1998*
Openness	37	35	33	41	52	47	57	70	82
Exports	19	17	15	18	24	22	27	33	43
Imports	19	18	18	23	29	25	30	37	39

Source : World Bank (2000)

Note :

- Openness represents the share of total exports plus imports as a percentage of GDP.
- For each variable and for each year, the figures represent unweighted averages across the following ten countries : Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.
- The average values for 1960 and 1965 do not include data on India and Pakistan as these data points were missing.

There was a decline in average trade shares between 1980 and 1985, when the share of both exports and imports in GDP fell. Between 1985 and 1995, most of the Asian economies that we consider in our sample began to adopt policies of structural reform and trade liberalisation was an integral part of such reform packages (see IMF, 1996). Meanwhile the South-East Economies of Malaysia, Korea and Thailand had already been open, in the sense that they had adopted strategies of export-led growth, during the 1970s decade itself. Over this period (i.e. between 1985 and 1995) the trade shares ratio picked

up and continued to increase significantly right up to 1998[13]. Both the exports and the imports shares increased significantly from 1985 onwards. By 1995, all the countries in the sample had put in place trade liberalisation measures. In the 1990s, particularly between 1990 and 1995, though the increase in export shares was still the highest for the South-East Asian nations, the exports share increased substantially for all the Asian countries, including the South Asian nations. During this period trade barriers were being reduced, particularly in developing countries, the world over. As such new export markets were opening up rapidly. The rise in these countries' export-GDP ratios could be a reflection of this factor.

The Latin American Economies In the Latin American economies, regarding the inter-sectoral composition of aggregate output, the share of agriculture in total output declined steadily over our period of analysis, even from its relatively low level as compared to the average for the Asian economies (Table 5 below).

Table 5 : Changes in Economic Structure in the Latin American Countries from 1960 to 1998 (% GDP)

	1960	*1965*	*1970*	*1975*	*1980*	*1985*	*1990*	*1995*	*1998*
Agriculture	16	18	16	15	13	12	11	10	9
Industry	33	29	32	34	35	34	35	32	30
Services	51	53	52	51	52	54	55	58	61

Source : World Bank (2000)

Note :

- Agriculture, Industry and Services, each represent the shares of value added in these sectors as a percentage of GDP.
- For each variable and for each year, the figures represent unweighted averages across the following eight countries: Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela.
- The average value for 1960 does not include data on Colombia, Dominican Republic and Mexico, as these data points were missing.

To start with, in 1960 the share of industry in the Latin American countries was, on average, substantially higher than in the Asian countries. From 1965 onwards up to 1980,

[13] There was a very sharp increase in average export shares between 1995 and 1998. This was because of a sharp increase in this share for Indonesia, Malaysia, Thailand, Philippines and Korea. In all probability this reflects the effects of the East Asian crisis that affected these economies in 1997-98. There were massive currency devaluations in the wake of the crisis, which would explain the sharp rise in the value of exports as a percentage of GDP. At the same time imports had to be drastically cut down, which is probably why,

the share of industry increased, even though the increase was not as marked as observed in the Asian economies. Thereafter from the 1980s decade however, the share of industry in aggregate output tended to stagnate and even decline, with this trend continuing well into the 1990s decade. In contrast the service sector's share in output remained more or less unchanged up to 1980, but from then onwards it has grown steadily, increasing the most between 1990 and 1998.

All the Latin American economies had put in place structural reforms programs (of which trade liberalisation is an integral component) by the end of the 1980s decade, except for Peru, which went in for such programs from the early 1990s onwards. Meanwhile Chile had adopted trade liberalisation programs from as early on as the middle of the 1970s decade. Up to 1970 the average trade shares ratio for the Latin American economies changed little (Table 6 below). Thereafter it increased sharply between 1970 and 1975, with a greater rise in the imports, than in the exports share.

Table 6 : Changes in Trade Openness in the Latin American Countries from 1960 to 1998 (% GDP)

	1960	*1965*	*1970*	*1975*	*1980*	*1985*	*1990*	*1995*	*1998*
Openness	34	31	33	41	41	42	49	50	51
Exports	17	15	16	19	19	22	25	24	24
Imports	16	16	18	22	22	20	24	25	27

Source : World Bank (2000)

Note :

- Openness represents the share of total exports plus imports as a percentage of GDP.
- For each variable and for each year, the figures represent unweighted averages across the following eight countries: Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela.

Up to 1985, the trade shares ratio remained fairly stable, but thereafter between 1985 and 1990 it again increased sharply and increased steadily through the 1990s decade. During this period the share of imports in GDP tended to increase more than the share of exports.

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the share of imports in GDP does not change very much (given the value of imports in local currency units was now higher).

3.2 The Econometric Model on Trade Openness and Structural Change Now we carry out an econometric exercise, which helps us answer questions like, how would greater openness affect the share of the non-agricultural sector in total output ? The basic empirical model we estimate follows from the simple idea that the extent of structural change depends upon the degree of openness of the economy to international trade. In this sense, structural change is, *inter alia*, a function of trade openness. With this basic idea we estimate an econometric model, where we use a measure of structural change as our dependent variable and a measure of trade openness as our independent variable. In addition we also include a measure of aggregate domestic absorption[14] and per capita income levels as additional regressors. The basic underlying idea is that apart from openness to international trade, aggregate domestic demand is also likely to affect the process of structural change. Further, the relation between openness, market size and structural change may be different for relatively poorer countries characterised by lower per capita income levels. We control for this possibility by introducing per capita incomes as the other right hand side variable in our regression exercise. The equations are estimated using the fixed effects estimation procedure[15] (also known as the least squares dummy variables approach), as we have a panel dataset. For each of the 18 countries in the sample we have 24 observations spanning the period 1975 to 1998[16]. The final dataset is described in detail in Part A of the Appendix below.

We estimate three sets of regression equations. In each case the share of agriculture in total output is the dependent variable. For the first set of regressions, along with the measures of domestic absorption and per capita incomes, the trade shares ratio (i.e., exports plus imports as a percentage of GDP) is taken as the independent variable. Here the objective is to estimate the relation between the extent of trade openness and change

[14] Aggregate domestic absorption is measured as C + I + G, using the familiar notation used in the National Income identity. C denotes aggregate consumption expenditure, I, aggregate investment expenditure and, G, aggregate government expenditure. This is expressed as percentage of GDP, just as the trade shares variable.

[15] For details on the fixed effects estimation procedure, properties of fixed effects estimators and comparison with other panel data estimators see the discussion in the Statistical Appendix on Panel Data at the end of the dissertation.

[16] In the World Bank (2000) dataset, the data on per capita incomes comparable across countries, is available only from 1975 onwards. This is why we are compelled to leave out the 15-year period from 1960 to 1974 in this part of our analysis.

in the sectoral composition of aggregate output as between the agricultural and the non-agricultural sectors. Then we estimate a second regression, replacing the trade shares ratio with the share of exports (expressed as a percentage of GDP), and in a third regression we replace it with the share of imports (as a percentage of GDP), keeping the other regressors unchanged. Our objective is to see whether the composition of the total trade basket (in terms of exports and imports) matters in determining how greater openness affects structural change, and if yes, exactly how it matters.

The fixed effects estimation procedure incorporates an intercept dummy for each country to control for omitted country specific factors correlated with the regressor, that would otherwise lead to biased coefficients. In addition, we incorporate a slope dummy variable to allow the slope coefficient for the openness variable to differ across the Latin American and Asian country groups. For as before we believe that structural differences may well affect the relation between trade openness and the sectoral composition of output and employment, between these two country groups.

Our econometric model of the relation between trade openness and structural changes in country j at time t takes the form,

(a) $Agr_{jt} = \beta_{jL}.\ OPEN_{jt} + (\beta_{jA} - \beta_{jL}).(D*OPEN_{jt}) + \gamma.MKT_{jt} + \eta.PCY_{jt} + \nu_j + \varepsilon_{jt}$ --(1)

(b) $Agr_{jt} = \beta_{jL}.\ EX_{jt} + (\beta_{jA} - \beta_{jL}).(D*EX_{jt}) + \gamma.MKT_{jt} + \eta.PCY_{jt} + \nu_j + \varepsilon_{jt}$ ----(2)

and

(c) $Agr_{jt} = \beta_{jL}.\ IM_{jt} + (\beta_{jA} - \beta_{jL}).(D*IM_{jt}) + \gamma.MKT_{jt} + \eta.PCY_{jt} + \nu_j + \varepsilon_{jt}$ ----(3)

where, ν_j is an unobserved country specific fixed effect; ε_{jt} is the normally distributed error term; D is a dummy variable which takes the value 1 for Asian countries and 0 for Latin American countries; Agr is the Value-added in the agricultural sector, expressed as a percentage of GDP ; OPEN is the trade shares ratio or total exports plus imports expressed as a percentage of GDP ; EX is total exports expressed as a percentage of GDP ; IM is total imports expressed as a percentage of GDP; MKT is the standard measure of aggregate domestic absorption, (C + I + G) expressed as a percentage of GDP; and PCY denotes GDP per capita income based on purchasing power parity exchange rates.

Given that the shares of the agricultural and non-agricultural sectors in GDP (expressed in percentage terms) add up to 100, once we estimate equations (1), (2) and (3), the relation between trade openness and the share of the non-agricultural is obtained, simply by subtracting these equations from 100. One set of results is reported below, while the rest of the estimated equations appear in Part A of the Appendix below[17].

Results and Implications Using the fixed effects estimation procedure and introducing a slope dummy[18] to control for differences in the relation between openness and structural change, between the Asian and Latin American country groups, we estimate the following equations :

$$\underset{\quad}{\text{Agr}} = \underset{(2.53)}{28.93^{*}} - \underset{(2.10)}{0.01^{*}}.\text{Open} - \underset{(-2.76)}{0.11^{*}}\,(\text{D*Open}) - \underset{(-0.31)}{0.03}\,.\,\text{MKT} - \underset{(-6.05)}{0.001^{*}}.\,\text{PCY} \quad \text{------(1)}$$

[R^2*within*= 0.58]

$$\underset{\quad}{\text{Agr}} = \underset{(2.85)}{33.44^{*}} - \underset{(-2.01)}{0.05^{*}}.\text{EX} - \underset{(-2.24)}{0.25^{*}}\,(\text{D*EX}) - \underset{(-0.73)}{0.08}\,.\,\text{MKT} - \underset{(-6.10)}{0.001^{*}}.\,\text{PCY}\text{----------(2)}$$

[R^2*within*= 0.59]

$$\underset{\quad}{\text{Agr}} = \underset{(2.0)}{23.46^{*}} - \underset{(-2.13)}{0.03^{*}}.\text{IM} - \underset{(-2.08)}{0.15^{*}}\,(\text{D*IM}) - \underset{(-0.20)}{0.02}\,.\,\text{MKT} - \underset{(-5.93)}{0.001^{*}}.\,\text{PCY}\text{----------(3),}$$

[R^2*within*= 0.57]

where, Agr = Value added in the agricultural sector as a percentage of GDP ; Open = Exports plus Imports as a percentage of GDP; EX = Exports as a percentage of GDP; IM = Imports as a percentage of GDP; D = Dummy variable that takes the value 1 for Asian countries and 0 for the Latin American countries; MKT = (C + I + G) expressed as a percentage of GDP; PCY = GDP per capita based on purchasing power parity exchange rates.

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[17] We also estimate these equations without a slope dummy. These results and the results with the share of the non-agricultural sectors as dependent variable are reported in Part A, Section 1in the Appendix to this chapter . Basically the latter equations are like mirror images of those with the share of agriculture as the dependent variable (since the shares add up to 100).

[18] We introduced slope dummies to allow for differences between the country groups w.r.t other two regressors. But in each case the dummies were insignificant, indicating that the nature of the relation between per capita income, domestic absorption and structural change and is essentially similar for the two country groups. As such we drop these slope dummies in the final regression reported above, as they would unnecessarily clutter the model otherwise. The main point to note is that introducing these dummies does not affect our basic results at all.

[The * indicates that the coefficient is significantly different from zero at the 5% level or better. The figures in parentheses below each coefficient report t-statistics. The number of observations in each case is 90]

For both the Asian and Latin American economies we get similar results. First, our results indicate that indeed trade openness does seem to affect the structure of the economy. Greater openness to international trade (measured by a higher share of exports plus imports in total GDP) is associated with a lower the share of agriculture and a correspondingly higher share of the non-agricultural sectors in total output. This tendency of the share of agriculture in total output to decrease (and that of the non-agricultural sector to increase correspondingly) with greater international trade holds irrespective of whether the increase in trade is due to an expansion of exports or of imports. We incorporated a slope dummy variable to allow for the possibility that the slope coefficient of the openness variable be different across the Asian and Latin American country groups. However for both country groups the *sign* of the slope coefficient is the same, indicating that the *direction* of the relation between openness and structural change is the same for both country groups. Thus our empirical analysis suggests that for developing countries in general, greater openness to international trade (whether this is associated with a greater share of exports or imports) is associated with a rise in the share of the non-agricultural sectors (and corresponding fall in that of the agricultural sector).

In terms of *magnitude*, however, we find that the impact of expansion in exports or imports on the sectoral composition of output is invariably larger for the Asian than for the Latin American economies in each case [equations (1), (2) and (3) above]. For instance, a percentage point increase in share of exports in GDP is associated with a fall in the share of agriculture by 0.30 percentage points for the Asian economies compared to 0.05 for the Latin American countries. Similarly for a percentage point increase in the share of imports in GDP, the share of agriculture decreases (and that of the non-agricultural sectors increase) by 0.15 percentage points for the Asian countries, compared to 0.03 for the Latin American economies.

Before going into further analysis of the empirical results, we would like to clarify that the econometric model estimated above does not, of course, establish the direction of causation among the variables concerned. To try and identify the causal mechanisms involved we turn to economic theory. Our discussion on the analytical underpinnings of the relation between international trade and structural change provide some pointers. Indeed we tried to establish how a change in trade volumes, would affect the process of structural change within an economy. Our econometric exercise lends some support to our claims.

For both the Asian and Latin American countries an increase in exports seems to be associated with an expansion of the non-agricultural sectors, at the expense of the agricultural sector. For the Asian countries, this result reflects, in part, the effect of the export promotion policies carried out by the bulk of the countries in our sample. A number of Asian countries, e.g., Malaysia, Indonesia, Thailand, the Philippines, Korea and even China (especially since the mid-1980s), have carried out export promotion policies that have encouraged manufactured exports. Most of these countries started off with exports of light manufactures (e.g., clothing, footwear, toys etc.), that require low-skilled labour, which these nations had an abundant supply of. Later, some of the countries in our sample, such as Korea, went in for manufactures of heavy machinery (see, Amsden, 1989). The experience of these countries seems to be in line with our regression result with respect to exports. For the bulk of the Latin American nations, exports consist of goods in which these countries have a natural comparative advantage, viz., agricultural commodities and fuel (in case of countries like Mexico and Venezuela). This could be one reason why for these countries a greater volume of exports affects the balance between the agricultural and non-agricultural sectors to a lesser extent than for the Asian economies. Basically our results indicate that exports do not affect the process of structural change in these economies as much as it does for the Asian nations.

Regarding imports, we find that a rise in the share of imports tends to have the same effect as an expansion of exports, viz., it seems to reinforce the process of industrial transformation of these nations. The most likely reason for this is probably the following.

None of the countries in our sample followed a policy of *free* trade[19]. They all had import restrictions, where only the extent of such restrictions varied across countries in our sample. Recently, in the late-1980s and early1990s, import controls were dismantled, particularly across South Asia and most of the Latin American countries in our sample (except for Chile). However, our period of analysis has relatively fewer observations in the 1990s, when the effect of such liberalisation would begin to work itself out. As such, it seems rational to argue that under a regime of import-controls, imports of producer goods and other items deemed essential from the point of view of the requirements of domestic industry, would receive preferential treatment (in terms of exemption from import duties, for example). This is probably why the results from our econometric exercise indicate that increased imports are associated with a positive impact on the share of the non-agricultural sector in aggregate output. In terms of magnitude, imports tend to have a larger impact on the sectoral composition of output in the Asian, as compared to the Latin American economies. The reason for this, in all likelihood, is linked to the fact that on average imports constitute a much larger share of GDP in the Asian than in the Latin American nations[20].

Regarding the domestic absorption variable, we find that it is statistically insignificant for both groups of countries, indicating that aggregate domestic absorption does not affect structural change in a way that is distinct from the effects of trade openness and income level. But the per capita income term is negative and significant indicating that with rising income levels there is a fall in the share of agriculture and a corresponding rise in the share of the non-agricultural sectors in total output. This result conforms to standard notions regarding the process of development viz., that rising income levels are associated with changes in the commodity composition of demand, with a shift away from agricultural products. This change in demand pattern with rising incomes tends to be reflected in the aggregate as a falling share of the agricultural sector and a corresponding rise in the share of the non-agricultural sectors in total output and

[19] Even the South-East Asian nations that promoted exports actively did not have a free trade regime.

[20] Among the Asian nations, the relatively smaller South-East Asian countries of Malaysia, Indonesia, Thailand, Philippines and Korea tend to have much larger import shares than the South Asian countries like India, Pakistan and Bangladesh.

employment. Arguably the domestic absorption variable is picking up an effect very similar to that captured by the per capita income term. This is probably a reason why this term is statistically insignificant, while its sign is negative, just as for the per capita income term.

3.3 The Commodity Composition of Exports and Imports We now examine the composition of imports and exports in the Asian and Latin American countries, over the period 1980 to 1998. Prior to this period we do not have comparable data on the commodity composition of exports and imports, for all countries in our sample. As such, we only look at this relatively small sub-period of our entire period of study, which stretches from 1960 to 1998. Still we can undertake some comparison regarding changes in the composition of exports and imports, after most of these countries adopted policies of trade liberalisation.

In 1980, except for Malaysia, Korea, Thailand and Chile, trade liberalisation measures had not been introduced in most of the other countries in our sample (see IMF, 1996; Cardoso and Helwege, 1995). Restrictions on international trade began to be eased in China and Indonesia in the early 1980s, but in most of the other countries trade liberalisation measures were introduced later in the 1980s decade (starting from the mid-1980s). In the early 1990s however, trade liberalisation had become more or less universal and by 1995, broad ranging trade policy reforms were in place in all the countries in our sample.

In our study we examine the commodity composition of these countries' external trade in 1980 and see how this changed in 1998. By 1998, trade liberalisation measures was introduced in all the countries in our sample and where liberalisation was already well underway, it was carried even further. As such all countries in our sample witnessed substantial increases in their trade volumes between 1980 and 1998. This is reflected, in part, by the increase in their international trade shares over this period (see Tables7 and 8 below). We also examine how the structure of the economy evolved during this period as we attempt to analyse the inter-relations between growth in international trade volumes,

change in the composition of the traded goods basket and the observed changes in economic structure.

First we study the main characteristics of the total trade baskets of the Asian and Latin American economies and see how this changed over our period of analysis. In terms of composition, the bulk of exports and imports for both, the Asian and the Latin American countries comprise 'goods', or 'merchandise' exports (Tables 7 and 8 respectively).

Table 7 : Changes in the Structure of International Trade in the Asian countries from 1980 to 1998 (%)

	1980	*1998*
Exports Share	24	43
Share of Merchandise Exports	86	85
Share of Service Exports	14	15
Imports Share	29	39
Share of Merchandise Imports	85	79
Share of Service Imports	15	21

Source : World Bank (2000).

Note :

- For each variable and for each year, the figures represent unweighted averages across the following ten countries : Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.
- Total exports and imports are expressed as a percentage of GDP (as in Table 4 above).
- Merchandise exports and imports are expressed as a percentage of total exports and imports respectively.
- Service exports and imports are calculated as 100 minus the shares of merchandise exports and imports.

Over this period trade in services grew in importance, but it still constituted only a small fraction of total trade in both country groups. In particular, in 1998 the share of services in total exports[21] is slightly higher in both country groups, while share of services in imports is higher in the Asian countries.

Table 8 : Changes in the Structure of International Trade in the Latin American Countries from 1980 to 1998 (%)

	1980	*1998*
Exports Share	19	24
Share of Merchandise Exports	83	82
Share of Service Exports	17	18
Imports Share	22	27
Share of Merchandise Imports	78	81
Share of Service Imports	22	19

[21] Percentage share of service exports in total exports is given by, 100 minus the percentage share of merchandise exports in total exports.

Source : World Bank (2000).

Note :

- For each variable and for each year, the figures represent unweighted averages across the following eight countries : Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela.
- Total exports and imports are expressed as a percentage of GDP (as in Table 4 above).
- Merchandise exports and imports are expressed as a percentage of total exports and imports respectively.
- Service exports and imports are calculated as 100 minus the shares of merchandise exports and imports.

The average share of exports and imports in GDP increased substantially in both groups of countries. However in terms of magnitudes, the increase in both imports and exports as a share of GDP was higher for the Asian countries. Having indicated these broad features of the overall trade basket, we now examine closely the commodity composition of merchandise trade for the Asian and Latin American countries and see how this changed over our period of analysis.

Composition of Exports Turning first to the Asian economies, the share of non-fuel exports in total merchandise exports rose by over 10 percentage points between 1980 and 1998 (Tables 9 below). The major fuel exporters in our sample are Indonesia, Malaysia and China. Fuels constituted over 20% of their exports in 1980. For these countries also the share of fuel exports fell sharply over the 18-year period in focus.

Table 9 : Commodity Composition of Exports for the Asian Countries from 1980 to 1998 (% Merchandise Exports)

	1980	*1998*
Fuels	15	4
Food	24	12
Agricultural Raw Materials	13	3
Ores and Metals	6	2
Manufactures	40	79

Source : World Bank (2000).

Note :

- For each variable and for each year, the figures represent unweighted averages across the following ten countries : Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.
- In the average values for 1980, the data for Indonesia actually pertains to 1981and for China it pertains to 1984.
- In the average values for 1998, the data for Sri Lanka actually pertains to 1994.
- See Part C of the Appendix to this chapter for details regarding the commodity composition of exports and imports.

The most noticeable change in export composition for the Asian countries was that the share of manufactures in total exports almost doubled over this period, accounting for nearly four-fifth of total merchandise exports, on average, by 1998. This came along with a falling share of agriculture-based exports. Thus the main change in the composition of exports for the Asian economies over the period 1980-1998, was the increased importance of manufactures and a corresponding decline in importance of agriculture-based exports, particularly exports of agricultural raw materials. This is the case for all the Asian economies except Korea, where manufactures already accounted for as much as 90% of merchandise exports in 1980 (and this share rose only marginally in 1998).

For the Latin American economies also, the share of non-fuel exports registered an increase of about 10 percentage points between 1980 and 1998 (Table 10 below).

Table 10 : Commodity Composition of Exports for the Latin American Countries from 1980 to 1998 (% Merchandise Exports)

	1980	*1998*
Fuels	24	14
Food	37	22
Agricultural Raw Materials	3	3
Ores and Metals	16	13
Manufactures	19	37

Source : World Bank (2000).

Note :

- For each variable and for each year, the figures represent unweighted averages across the following eight countries: Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela.
- The average values for 1998 exclude the Dominican Republic, for which no data is available for the 1990s.
- See Part C of the Appendix to this chapter for details regarding the commodity composition of exports and imports.

However on average fuel exports, as also exports of food and industrial raw materials (consisting of Ores and Metal exports) accounted for a larger proportion of merchandise exports for these countries than for the Asian nations. The share of manufactures in total exports also increased for these countries, but exports of manufactures still accounted for less than two-fifth of merchandise exports for these economies by 1998. By 1998, the main change in the composition of the Latin American countries' export basket was,

manufactures replacing food, as the category accounting for the highest share of merchandise exports.

Thus, in both the Asian and Latin American countries, policies of liberalisation seem to have been associated with growing importance of manufactures and a falling share of agriculture-based commodities (both food and raw materials), in total merchandise exports. However, we do recognise that liberalisation policies may be just one factor underlying this change in the composition of exports and that this could have also been caused by other factors (such as changes in world demand conditions, or a change in government policies towards the export sector and so on).

Composition of Imports By 1980, imports of manufactures already constituted over half of merchandise exports, on average, for both the Asian and the Latin American countries (Tables 11 and 12 below). This was true for each of the Latin American countries in our sample, except Brazil, where just over two-fifths of total imports comprised of manufactures.

Table 11 : Commodity Composition of Imports for the Latin American Countries from 1980 to 1998 (% Merchandise Imports)

	1980	*1998*
Fuels	15	5
Food	14	10
Agricultural Raw Materials	2	2
Ores and Metals	3	2
Manufactures	65	80

Source : World Bank (2000).

Note :

- For each variable and for each year, the figures represent unweighted averages across the following eight countries: Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela.
- The average values for 1998 exclude the Dominican Republic, for which no data is available for the 1990s.
- See Part C of the Appendix to this chapter for details regarding the commodity composition of exports and imports.

Among the Asian countries, in 1980 India had the lowest share of manufactures in its total import basket (just under 40%), while for Korea and Philippines the share exceeded two-fifths of total exports. Fuels and food were next in importance in terms of share in

total imports, for both groups of countries, followed by the imports of agricultural and industrial raw materials (Ores & Metals).

Table 12 : Commodity Composition of Imports for the Asian Countries from 1980 to 1998 (% Merchandise Imports)

	1980	*1998*
Fuels	22	11
Food	12	10
Agricultural Raw Materials	4	4
Ores and Metals	4	3
Manufactures	55	71

Source : World Bank (2000).

Note :

- For each variable and for each year, the figures represent unweighted averages across the following ten countries : Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.
- In the average values for 1980, the data for Indonesia actually pertains to 1981and for China it pertains to 1984.
- In the average values for 1998, the data for Sri Lanka actually pertains to 1994.
- See Part C of the Appendix to this chapter for details regarding the commodity composition of exports and imports.

This basic picture regarding the commodity composition of these countries' import baskets essentially remained unchanged between 1980 and 1998. The main change over this period, is a fairly sharp increase in the share of manufactures in total imports. Thus, after these countries adopted policies of trade liberalisation, we observe a tendency for their share of manufacture imports to increase. With the exception of Pakistan, for all the Asian countries that went in for trade liberalisation policies after 1980, the share of manufactures in total imports increased by at least 10 percentage points or more, by 1998. The share of manufactured imports increased by at least 10 percentage points over this period for all Latin American countries that adopted trade liberalisation policies from the late 1980s onwards, except for Venezuela and Peru. For the latter countries the share of manufactures in total imports was already well over 70%, by 1980. Brazil experienced the maximum increase in the share of manufactures - as much as 35 percentage points.

We now examine how the sectoral composition of output changed over this period. In particular we shall try to analyse if anything about the nature of the change in the sectoral

output structure to suggest that this could be linked to developments on the international trade front.

Change in the Sectoral Composition of Output There are two similarities in the nature of the change in the sectoral composition of aggregate output for the Latin American and Asian country groups over the period 1980 to 1998 (Tables 13 and 14). In both cases the share of agriculture declined and that of services increased. Regarding the share of the industrial sector, while on average this increased in the Asian countries, it actually fell quite sharply in the Latin American nations.

For the Latin American countries the tendency for a decline in the share of industry in aggregate output began in the early 1980s.

Table 13 : Changes in Economic Structure in the Latin American Countries from 1980 to 1998 (% GDP)

	1980	*1998*
Agriculture	13	9
Industry	35	30
Services	52	61

Source : World Bank (2000)

Note :

- For each variable and for each year, the figures represent unweighted averages across the following eight countries: Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela.

Almost from the beginning of the 1980s decade there was a tendency for this share to stagnate and thereafter it even started to decline. As we discussed earlier in the previous two chapters, the reason for this is related, in all probability, to the international debt crisis faced by the Latin American countries in the early 1980s. The crisis, which started off with Mexico declaring a moratorium on its foreign debt obligations in 1982, triggered off a crisis of investor confidence in this region. An immediate impact of this was a severe shortage in the inflow of foreign lending, especially commercial lending, to almost all countries in the region. The affected countries were compelled to go in for stabilisation programs, which among other things involved sharp cutbacks in government expenditure. Faced with a cutback in government expenditure on the demand side and a severe shortage in funding for imports, domestic industry was squeezed from the demand

and supply sides and tended to go into recession. The fall in the share of industrial value added could be one reflection of these developments, whose effects were being felt even in the 1990s decade. For during a recession, on the supply side, investment and capital formation in the industrial sector tend to be adversely affected. The long term consequence of this, especially under conditions where direct foreign investment in not forthcoming and where the government faces a resource constraint, is that growth of industry is slow to pick up. Further on the demand side, aggregate demand, especially consumer demand remains low and this tends to further reinforce the slowdown in industrial growth.

Table 14 : Changes in Economic Structure in the Asian Countries from 1980 to 1998 (% GDP)

	1980	*1998*
Agriculture	27	18
Industry	34	36
Services	39	46

Source : World Bank (2000)

Note :

- For each variable and for each year, the figures represent unweighted averages across the following ten countries : Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, China and Korea.

For the Asian economies, there is a decline in the share of agriculture and a rise in the shares of the industrial and services sectors between 1980 and 1998. This is in line with the trend observed in these economies right from the beginning of our period of analysis (see Table 1, Section 3.1 above). For these economies, greater openness to international trade seems to be associated with the kind of structural change that was underway even when protective barriers restricting international trade flows were in place. Then, the government could regulate, in particular, the composition of imports, and domestic economic factors must have had greater influence in shaping economic outcomes. For a number of countries in our sample, especially the South Asian economies (which liberalised trade regimes only in the late 1980s and early 1990s), we cover a relatively short time span in the post-liberalisation phase. As such, the effect of trade liberalisation, for these countries, may not yet be reflected in the aggregate data. As we argued earlier, ultimately the impact of liberalisation on economic structure would be determined, to a

large extent by the change in the composition of import basket and the by whether or not the imported goods tend to substitute domestically produced goods in the domestic consumption basket.

3 Conclusion

The main findings from our study can be summarised as follows. For both, Asian and Latin American economies we find that greater openness to international trade is associated with a fall in the share of the agricultural sector and a rise in the share of the non-agricultural sectors. In short, for given levels of domestic absorption and per capita incomes, greater openness seems to be associated in this case with the kind of structural change that is desirable from the point of view of the industrial transformation of a developing economy.

As for the composition of the exports and import baskets, for both country groups it seems that after trade liberalisation measures were introduced there was a marked increase in the share of manufactures and a fall in the share of agricultural goods. For the Asian countries it would appear that the imports of manufactures are not yet affecting domestic industrial production in an adverse way (or not in a sufficiently adverse way, for it to show up as a fall in the share of the industrial sector in the economy). For the Latin American countries, we observe a fall in the share of industrial value added, between 1980 and 1998. However as we argue above this in all likelihood is because of the cumulative impact of the eighties debt crisis on the entire region.

Having analysed the relation between international trade and the process of structural change we finally turn to its implications for the relation between trade and the overall distribution of income in the next chapter, which lays out the main conclusions from our study so far.

Appendix

Part A. Econometric Exercise relating Structural Change and Trade Openness

1 Description of the Data

For each of the 18 countries[22] in our sample we have data on the following variables : Value added in agriculture, industry and services, each expressed as a percentage of GDP; total exports and imports of goods and services, each expressed as a percentage of GDP; aggregate domestic absorption, (C + I + G)[23], also expressed as a percentage of GDP ; and GDP per capita income, based on purchasing power parity[24]. Data on each of the variables is taken from World Bank (2000). In this database observations on the GDP per capita variable is available only from 1975. Therefore for each country we have data for 24 years, from 1975 to 1998 and for the regression analysis, we take 5-yearly averages[25] of each of the variables. This generates, 5 data points per country corresponding to the periods, 1975-79, 1980-84, 1985-89, 1990-94 and 1995-98. Thus we have a total number of 90 observations available for the regression analysis.

2 The Results

We report three sets of estimated equations below. Each equation is estimated using the fixed effects estimation procedure[26]. For the first set we use the general measure of trade openness (i.e., exports plus imports as a percentage of GDP) as the independent variable and for the second and third sets the export and imports shares respectively are used as

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[22] The ten Asian countries are Bangladesh, China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand. The eight Latin American countries are, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela.

[23] This represents aggregate consumption, investment and government expenditure, as in the standard National Income identity.

[24] This represents per capita incomes based on GDP calculated on the basis of purchasing power parity (PPP). That is, GDP converted to current international dollars using PPP exchange rates. An 'international dollar' has the same purchasing power over GDP as the U.S. dollar in the United States.

[25] Except for the last period, which consists of observations for the four years, 1995, 1996, 1997 and 1998.

[26] The Hausman test selects the fixed effects over the random effects model, rejecting the null of zero correlation between the country specific effect and the regressor.

regressors. In each case the share of the agricultural (and non-agricultural) sector is the dependent variable and aggregate domestic absorption and per capita income levels are the also included as explanatory variables.

2.1 Results with Trade Openness as the Independent Variable

First, we estimate the equations without introducing a slope dummy. Next we introduce a slope dummy variable to control for the differences that may arise in the relation between structural change and trade openness for the Asian and Latin American countries. We report results both with the share of agriculture [equations (1) and (1)'] and that of the non-agricultural sectors in total output.

The estimated equation is,

$$\underset{}{Agr} = \underset{(2.61)}{30.33^{*}} - \underset{(-2.90)}{0.0.8^{*}}.Open - \underset{(-0.32)}{0.04}.MKT - \underset{(-5.78)}{0.001^{*}}.PCY \quad \text{------(1)}$$

[R^2*within*= 0.56]

Introducing a slope dummy variable to control for differences in the relation between openness and structural change for the two countries[27],

$$\underset{}{Agr} = \underset{(2.53)}{28.93^{*}} - \underset{(2.10)}{0.01^{*}}.Open - \underset{(-2.76)}{0.11^{*}}(D*Open) - \underset{(-0.31)}{0.03}.MKT - \underset{(-6.05)}{0.001^{*}}.PCY \quad \text{------(1)'}$$

[R^2*within*= 0.58]

where, D is a dummy variable which takes the value 1 for Asian countries and 0 for Latin American countries; Agr is the Value-added in the agricultural sector, expressed as a percentage of GDP ; OPEN is the trade shares ratio or total exports plus imports expressed as a percentage of GDP ; MKT is the standard measure of aggregate domestic absorption, (C + I + G) expressed as a percentage of GDP; and PCY denotes GDP per capita income based on purchasing power parity exchange rates.

[27] Initially we also included slope dummy variables for the MKT and PCY variables. However these were insignificant, thereby indicating that there are no significant differences in the relation between openness and these two variables for the two country groups. Therefore we decided to run the final regression without these slope dummies, which do not affect the results reported here in any way.

[The * indicates that the coefficient is significantly different from zero at the 5% level or better. The figures in parentheses below each coefficient reports t-statistics based on robust (White heteroscedasticity-consistent) standard errors]

Since the shares of the agricultural and non-agricultural sectors together add up to 100, by subtracting each of equations (1) and (1)′ from 100, we get the relation between openness and the non-agricultural sectors in the economy. This changes the value of the constant term in equations (1) and (1)′, and reverses the signs of the independent variables even as their values and levels of statistical significance remain the same.

The estimated equation is,

$$\underset{}{\text{NonAg}} = \underset{(2.61)}{69.67^{*}} + \underset{(-2.90)}{0.0.8^{*}}.\text{Open} + \underset{(-0.32)}{0.04}\,.\,\text{MKT} + \underset{(-5.78)}{0.001^{*}}.\,\text{PCY} \quad \text{------(2)}$$

[R^2*within*= 0.56]

Introducing a slope dummy variable for the openness variable,

$$\underset{}{\text{NonAg}} = \underset{(2.53)}{71.07^{*}} + \underset{(2.10)}{0.01^{*}}.\text{Open} + \underset{(-2.76)}{0.11^{*}}\,(\text{D*Open}) + \underset{(-0.31)}{0.03}\,.\,\text{MKT} + \underset{(-6.05)}{0.001^{*}}.\,\text{PCY} \quad \text{----(2)}'$$

[R^2*within*= 0.58]

where, NonAg = Value added in the Non-Agricultural sectors (Industry and Service) as a percentage of GDP.

[The * indicates that the coefficient is significantly different from zero at the 5% level or better. The figures in parentheses below each coefficient reports t-statistics based on robust (White heteroscedasticity-consistent) standard errors]

2.2 Results with Exports-Share as the Independent Variable

As before we report two sets of results below, the first without introducing a slope dummy variable and the second, with a slope dummy to control for differences in the relation between exports and structural change for the Asian and Latin American country groups. Results are reported both with the share of agriculture [equations (3) and (3)′] and that of the non-agricultural sectors in total output [equation (4) and (4)′].

The estimated equation is,

$$Agr = 38.38^{*} - 0.16^{*}.EX - 0.11 . MKT - 0.001^{*}. PCY \text{----------(3)}$$
$$(3.23) \quad (-2.90) \quad (-1.03) \quad (-5.78)$$

[R^2*within*= 0.56]

Introducing a slope dummy variable for the exports share variable,

$$Agr = 33.44^{*} - 0.05^{*}.EX - 0.25^{*} (D*EX) - 0.08 . MKT - 0.001^{*}. PCY \text{----------(3)'}$$
$$(2.85) \quad (-2.01) \quad (-2.24) \quad (-0.73) \quad (-6.10)$$

[R^2*within*= 0.59]

where, D is a dummy variable which takes the value 1 for Asian countries and 0 for Latin American countries; Agr is the Value-added in the agricultural sector, expressed as a percentage of GDP ; EX is total exports expressed as a percentage of GDP ; MKT is the standard measure of aggregate domestic absorption, (C + I + G) expressed as a percentage of GDP; and PCY denotes GDP per capita income based on purchasing power parity exchange rates.

[The coefficients marked with a * indicate that these are statistically significant at the 95% level of confidence or less. The figures in parentheses below each coefficient reports the White heteroscedasticity-consistent standard errors]

For the non-agricultural sector the equation is,

$$NonAg = 61.62^{*} + 0.16^{*}.EX + 0.11 . MKT + 0.001^{*}. PCY \text{----------(4)}$$
$$(3.23) \quad (-2.90) \quad (-1.03) \quad (-5.78)$$

[R^2*within*= 0.56]

Introducing a slope dummy variable,

$$NonAg = 66.56^{*} + 0.05^{*}.EX + 0.25^{*} (D*EX) + 0.08 . MKT + 0.001^{*}. PCY \text{---------(4)'}$$
$$(2.85) \quad (-2.01) \quad (-2.24) \quad (-0.73) \quad (-6.10)$$

[R^2*within*= 0.59]

where, Non Ag = Value added in the Non-Agricultural Sectors (Industry and Service) as a percentage of GDP

2.3 Results with the Imports Share as the Independent Variable

Once again we report two sets of results, the first without and the second with a slope dummy variable to control for the differences in the relation between imports and structural change for the Asian and Latin American country groups. Results with both, the share of agriculture and that of the non-agricultural sectors as dependent variables, are reported below [equations (5), (5)′ and (6), (6)′ respectively].

The estimated equation is,

$$\underset{}{Agr} = \underset{(2.0)}{22.29^{*}} - \underset{(-2.90)}{0.16^{*}}.IM - \underset{(-0.37)}{0.04}.MKT - \underset{(-5.78)}{0.001^{*}}.PCY \text{----------(5)},$$

[R^2*within*= 0.56]

Introducing a slope dummy variable for the import share variable,

$$Agr = \underset{(2.0)}{23.46^{*}} - \underset{(-2.13)}{0.03^{*}}.IM - \underset{(-2.08)}{0.15^{*}}(D*IM) - \underset{(-0.20)}{0.02}.MKT - \underset{(-5.93)}{0.001^{*}}.PCY \text{----------(5)}',$$

[R^2*within*= 0.57]

where, D is a dummy variable which takes the value 1 for Asian countries and 0 for Latin American countries; Agr is the Value-added in the agricultural sector, expressed as a percentage of GDP ; IM is total imports expressed as a percentage of GDP; MKT is the standard measure of aggregate domestic absorption, (C + I + G) expressed as a percentage of GDP; and PCY denotes GDP per capita income based on purchasing power parity exchange rates.

[The coefficients marked with a * indicate that these are statistically significant at the 95% level of confidence or less. The figures in parentheses below each coefficient reports the White heteroscedasticity-consistent standard errors]

For the non-agricultural sector the equation is,

$$NonAg = \underset{(2.0)}{77.71^{*}} + \underset{(-2.90)}{0.16^{*}}.IM + \underset{(-0.37)}{0.04}.MKT + \underset{(-5.78)}{0.001^{*}}.PCY \text{----------(6)},$$

[R^2*within*= 0.56]

Introducing a slope dummy variable for the import share variable,

$$NonAg = \underset{(2.0)}{76.54^{*}} + \underset{(-2.13)}{0.03^{*}}.IM + \underset{(-2.08)}{0.15^{*}}(D*IM) + \underset{(-0.20)}{0.02}.MKT + \underset{(-5.93)}{0.001^{*}}.PCY \text{---------(6)}',$$

[R^2*within*= 0.57]

Part B. Definition of the International Trade Related Variables

The details regarding the commodity composition of exports and imports are given below. The source of this data is World Bank (2000).

(1) Exports of goods and services represent the value of all goods and other market services provided to or received from the rest of the world. Included is the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. Labor and property income (formerly called factor services) is excluded. Transfer payments are excluded from the calculation of GDP.

(2) Imports of goods and services represent the value of all goods and other market services provided to or received from the rest of the world. Included is the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. Labor and property income (formerly called factor services) is excluded.

(3) Merchandise exports show the f.o.b. value of goods provided to the rest of the world valued in U.S. dollars. They are classified using the Standard International Trade Classification (SITC). Data are in current U.S. dollars.

(4) Merchandise imports show the c.i.f. value of goods received from the rest of the world valued in U.S. dollars. Merchandise imports are classified using the Standard International Trade Classification (SITC). Data are in current U.S. dollars.

(5) Food comprises the commodities in SITC sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and SITC division 22 (oil seeds, oil nuts, and oil kernels).

(6) Agricultural raw materials comprise SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap).

(7) Fuels comprise SITC section 3 (mineral fuels).

(8) Ores and metals comprise the commodities in SITC sections 27 (crude fertilizer and minerals); 28 (metalliferous ores and scrap); and 68 (non-ferrous metals).

(9) Manufactures comprise commodities in SITC sections 5 (chemicals), 6 (basic manufactures), 7 (machinery and transport equipment), and 8 (miscellaneous manufactured goods), excluding division 68 (non-ferrous metals).

Chapter 6

International Trade and the Distribution of Income

In this dissertation we posed the broad question, how is the overall distribution of income within developing countries likely to be affected, as countries engage in a greater volume of international trade? Here we present the main conclusions that emerge from our analysis in the preceding chapters, and discuss how far they help us to provide a clear-cut answer to this question. In what follows, we first summarise the main findings from our analysis so far and then draw out their implications regarding the relation between international trade and the overall distribution of income.

1 The Framework of Analysis

The broad structure of our argument is as follows. We argue, in order to understand the relation between international trade and the distribution of income, it is first necessary to understand what factors affect the overall distribution of income within an economy. As such, our analysis is carried out in two parts. In the first part, we study an important factor that is likely to influence the personal income distribution within an economy; in the second, we study the interaction of international trade with this factor. In particular, we find that, *inter alia,* the process of structural change in an economy could have important implications for changes in the overall distribution of income. Therefore, we focus on the relation between international trade and structural change, where essentially we examine whether structural change is an important channel via which trade affects income distribution. At this juncture we would like to make it clear that we do *not* argue that structural change is the only channel via which international trade affects the distribution of income. Our analytical framework stresses, it is *an* important factor affecting the overall distribution of income in the economy; while our empirical analysis attempts to verify its importance on the basis of the experiences of a group of eighteen developing economies.

1.1 Structural Change and Income Inequality The first part of our analysis on the determinants of overall income inequality in the economy, draws heavily on Kuznets (1955). Our main argument here is that, the process of industrial transformation of an economy, has distinct implications regarding changes in the pattern of income distribution. In simple terms, our main analytical premise is the following. In the context of a developing economy, the process of industrial transformation is supposed to be accompanied by a rise in overall income inequality in the economy. The reason for this is straightforward. Per capita incomes, and income inequality within the non-agricultural sectors, particularly the industrial sector, tends to be higher than within agriculture. Therefore, as the industrial sector expands and absorbs labour from the rural, agricultural sector, the extent of income inequality in the economy tends to increase.

There are several dimensions of this process of industrial transformation that have a bearing on its impact on the distribution of income. We discuss the implications of some of these in the dissertation. Now, a change in the sectoral composition of aggregate output is a manifestation of the process of structural change in an economy. In particular, the process of development is supposed to be accompanied by a rise in the shares of the non-agricultural sectors and a corresponding fall in the share of the agricultural sector in total output. The distributional implications of this process would depend on a number of factors.

For instance, a rise in the share of the industrial sector in aggregate output may or may not be accompanied by a rise in employment. In a hypothetical scenario, employers' decision to increase industrial output may leave employment unchanged as only labour productivity rises. In this case, the output per worker in the industrial sector rises as a result of technological progress. The implications of this process for the overall distribution of income, would depend upon the distribution of the fruits of enhanced productivity, as between wages and profits (see for instance, Kalecki, 1954 and 1971).

In particular, we argue that in developing countries capital and investible resources in general are relatively scarce commodities. Their ownership tends to be concentrated

among a relatively small number of people, who constitute only a tiny fraction of the total population. The bulk of the population is poor, with very few assets, other than their labour with which to make a living. As such, a large share of the population tends to be wage earners, and a much smaller share, profit earners. This implies two things : (a) the bargaining power of workers tends to be weaker than that of capitalists who employ them[1] and (b) a rise in the share of profits would increase the incomes of a relatively small and rich section of the population and therefore, tend to increase overall inequality in the economy.

In an alternative scenario, a rise in output of the industrial sector may be followed by an expansion of employment. If the expansion of industrial employment is accompanied by a transfer of labour from the agricultural to the industrial sector, following Kuznets, it would appear that this process has extremely clear cut implications regarding the nature of change in overall income inequality in the economy, viz., inequality would tend to increase. However, taking into account certain structural features of developing economies, it may well be the case that with a rise in the employment-share of the non-agricultural sector, income inequality in the economy does not increase. In fact, overall inequality may actually remain unchanged under certain circumstances.

A particular structural feature of developing countries, that tends to influence the change in its income distribution, is the existence of an informal sector. We discussed the characteristics of the informal sector, as distinct from the formal sector, at length in the third and fourth chapters. Basically, economic units in the informal sector bypass most government regulations and provide employment at some of the lowest wages in the economy. This sector tends to act as a residual, absorbing the bulk of those who fail to secure better jobs in the formal sector of the economy, albeit at very low wages. When the workers moving out of the agricultural sector are absorbed primarily in the informal segment of the non-agricultural sector, this may well result in a situation where overall inequality in the economy remains unaffected. This happens when the workers' incomes do not rise significantly even after they have moved into the non-agricultural sector.

[1] As such the distribution of value-added would tend to be skewed in favour of profits rather than wages.

Assuming they were poor initially, these workers remain poor even after they moved into the non-agricultural sector. From the viewpoint of the overall distribution of income, in this situation, the income share of the lower income groups does not rise significantly vis-a-vis that of the higher income classes. As such, *ceteris paribus*, overall inequality (which is essentially about the income gap between the rich and the poor) does not change very much in this case.

Essentially therefore, our analytical construct on the relation between structural change and income inequality is based on the following proposition. We argue, first, that indeed the process of structural change will have definite implications regarding changes in the overall distribution of income within the economy. However, the effect will not always be as clear cut as might appear from the analysis in Kuznets (1955). In the context of developing economies, it seems that inequality would tend to increase with a rise in the share of the non-agricultural sectors in total output. However, this need not always be so. As we discuss above, there might well be a scenario where structural change occurs in a way so as to leave overall inequality in the economy relatively unaffected.

1.2 International Trade and Structural Change International trade is introduced in the second part of our analysis, where essentially we focus on its relation with structural change. We argue that the prevalent policy regime will have an important role to play in this context. An important policy goal of developing countries the world over is to create a sound domestic industrial base. However, the exact strategy adopted for promoting the growth of domestic industry, varies from country to country. Some countries go in for an industrialisation program based on the domestic market. In this case tariff (and non-tariff) barriers are put in place in order to regulate the inflow of foreign goods. Yet other countries compete for a share of the world market and attempt to develop an industrial base that produces mainly for the world market. Very often the choice of such industrial strategy is actually based on the constraints imposed by the size of the internal market. For instance, the smallness of the domestic market may compel a country to opt for export-based industrialisation, as this may be the only way of achieving scale economies in production.

Consider the case of countries adopting a strategy of industrialisation on the basis of the home market. This is widely referred to in the literature as a policy of ISI, or Import Substituting Industrialisation. When there are protective barriers to the entry of imports, in general, the government treats preferentially, imports of all commodities considered essential for domestic industry and for export-production. As such, we can expect that under a protected trade regime, an increase in the volume of imports would tend to reinforce the process of industrial transformation of the economy. Whereas, once barriers to entry are eased, the composition of imports changes and begins to reflect the preferences of domestic consumers. In this case, it may happen that after trade liberalisation policies are put in place, the import content of domestic consumption rises. When imported goods are a substitute for domestically produced goods, it may be the case that imports out-compete such goods; in which case domestic producers lose out. In such a situation, a rise in the volume of imports may actually set back the process of industrialisation. Therefore, it can be argued that essentially the role of imports in affecting the process of structural change in the economy depends largely on the prevalent trade policy regime.

Regarding exports also, government policy plays an important role in determining how these affect the process of structural change in the economy. Now most developing countries tend to have a natural comparative advantage in agricultural products or other natural resource based commodities. However, it is widely recognised that by relying on primary exports these countries can never hope to catch up with the industrial world[2]. As such, many economies use the opportunity to produce for the world market, to develop a domestic industrial base[3]. This would be especially true for smaller countries, where it is not possible to develop a diversified industrial structure, based on the home market alone. Now typically, overpopulated developing economies tend to have an abundant supply of low skilled labour. Therefore, countries embarking on a program of export led

[2] This apprehension is particularly compounded by the concern that primary goods exporters tend to face deteriorating terms of trade in the long run.

[3] However Sarkar and Singer (1991) argue that even this may not allow developing countries to escape unequal exchange relations with the industrial countries. For the period 1965-1985 these authors show that developing countries' barter terms of trade in manufactures (vis a vis developed countries) showed signs of

industrialisation, tend to start off by specialising in the production (and export) of light manufactures, that requires low-skilled labour and little by way of costly investment in capital and technical know-how. In this case, when governments use production for exports as an instrument of domestic industrialisation, we would expect, a greater volume of exports to act as a catalyst for the process of industrial transformation of these economies. Yet, there are other instances when governments simply rely on exports of agricultural commodities and natural resources in order to earn much-needed foreign exchange. In this case we may or may not observe a tendency for exports to be conducive to the process of industrial transformation of these economies. Obviously production for exports would not directly affect the industrial sector in this case. Rather, the use which foreign exchange earnings from exports are put to, may indirectly affect the process of structural change. In case these are used to finance the import of consumer goods that ultimately out compete domestic goods and replace them in the domestic consumption basket, a larger volume of exports would be associated with de-industrialisation. When these are used to finance the imports of inputs necessary for domestic industry, the indirect effect of exports would be to reinforce the process of industrial transformation of the economy.

1.3 International Trade and Income Distribution Regarding the impact of trade upon income distribution, the foregoing analysis indicates this would depend upon a number of factors. Where international trade acts as a catalyst in the process of industrial transformation of the economy, in general, we would expect inequality to increase with a greater volume of international trade. However, in case production for traded goods creates employment in the informal sector, it may well be the case that even after an expansion in the volume of trade, overall inequality in the economy remains relatively unaffected[4]. Where international trade causes de-industrialisation, it may appear that overall inequality would tend to go down, for there is a reversal of the process of labour

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weakness and failed to reflect respective productivity trends, ultimately resulting in deterioration in factoral terms of trade

[4] Developing countries are typically characterised by the existence of a large informal sector where workers receive some of the lowest wages in the economy. In order to take advantage of low wages, to keep costs low, exporters often locate at least a part of their production processes in the informal sectors. We have

transfer from low-income to high-income sectors (i.e., those losing jobs in the high income sector are absorbed back in the low-income sector once again). However, we argue that even in this case overall inequality would tend to increase, as an economic downturn tends to have an asymmetric effect on the rich and the poor. Essentially, this may happen because even if the income of the rich falls, the poor suffer an even greater fall in incomes[5]. As such the gap between the poor and the rich widens and overall inequality tends to increase. This is because in a climate of economic adversity, the rich are better able to protect their real incomes (for instance, they may have insurance, interest incomes, incomes from sale of assets etc. which to fall back on), as compared to the poor.

2 The Empirical Analysis

Having presented our main analytical construct, we now describe to what extent our ideas are supported by empirical facts, based on data from a selected group of developing countries. We examine data on a set of eighteen developing countries, where essentially we focus on their experience regarding structural change, income distribution and international trade. We essentially want to examine the questions : (a) to what extent the does the process of structural change explain changes in income distribution in these countries ?; and (b) what kind of structural change is associated with international trade ? From here we try to interpret, what kind of change in overall inequality could be associated with greater openness to international trade in these countries.

Typically, overall income inequality is a variable that changes very slowly over time. As such, we try to include as long a period of time in our study as is permitted by the availability of data, particularly on income inequality. Our period of analysis stretches from 1960 to approximately the middle of the 1990s decade. In our data set we have ten developing countries from Asia (Bangladesh, China, India, Indonesia, Korea, Malaysia,

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argued that expansion of employment opportunities in the informal segment of the economy may not affect overall income inequality very much.

[5] Typically in developing countries there is no provision of a safety net (a social security system, for instance) for the lower income groups, as prevalent in most developed countries, especially across Europe.

Pakistan, Philippines, Sri Lanka and Thailand), and eight from Latin America (Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela)[6]. Regarding, data sources, the observations on income distribution are mainly from the high quality dataset on Gini coefficients compiled by Deininger and Squire (1996a) and from UNDP (1999). Data on sectoral employment shares is from ILO (1999). For all other variables the data are from World Bank (2000).

2.1 Results on Structural Change and Income Inequality To begin with, there are certain differences in structural characteristics between the Asian and Latin American country groups. Also, the country experiences differ with regard to the extent of inequality in the overall distribution of income. Regarding the sectoral composition of aggregate output, we note that on average, in the Asian countries agriculture accounts for a larger share of total output than for the Latin American countries[7]. Whereas, the service sector accounts for a substantially larger share of output in the Latin American nations, on average, than in the Asian countries. As for industry, to begin with in the 1960s, on average, the industrial sector accounted for a higher share of output in Latin America. However, by the 1990s decade, the share of industry in total output, on average, had risen substantially in the Asian economies (particularly the South-East Asian countries) and was comparable with that in the Latin American nations[8]. Regarding income inequality, this was substantially higher in all Latin American countries than in the Asian ones. As for international trade, an important difference between the two country groups is that, the primary goods component (including fuels) in the export basket was much higher for the Latin American nations on average, compared to the Asian countries[9]. Due to these

[6] Our choice of specific countries is dictated entirely by the availability of data, especially on Gini coefficients. For details regarding the criteria used for selecting countries in the final dataset see Appendix to Chapter 3, Part A, subsection : "The Final Dataset" (Page 74).

[7] Of course, there are variations within the group of Asian countries as well. The share of agriculture in total output is highest among the South Asian nations (India, Bangladesh and Pakistan), followed by the South East Asian countries of Malaysia, Indonesia, Thailand and Philippines. Korea has the smallest share of agriculture in total output. In fact the industrial sector accounts for the highest share of total output in Korea and China.

[8] The slowdown in industrial growth across Latin America, in the 1980s, was no doubt one reason why the share of industry in output failed to grow over this decade, as much as it had previously.

[9] An important similarity regarding the trade regime is that no country in either country group followed policies of free trade for the entire period of analysis. At some point of time, particularly, in the 1980s decade, most of these countries adopted trade liberalisation policies.

differences, it seemed reasonable to expect that the relation between structural change and income inequality might be somewhat different for the two country groups. As such in the econometric model we introduced a dummy variable to control for these differences.

We find that over our period of analysis, on average, income inequality remained more or less unchanged in almost all the Asian countries in our sample, while it increased in the Latin American countries. In particular, inequality increased sharply over the 1980s decade in each of the Latin American countries in our sample. In the first part of the dissertation we sought to understand, to what extent the process of structural change in these countries could explain this change in inequality. By structural change we essentially referred to the process of industrial transformation of these economies and to the associated change in the sectoral composition of aggregate output and employment. However, owing to the lack of comparable data on sectoral employment shares, for the large part of the analysis, we interpret structural change as the process of change in sectoral output shares. We focus on change in employment shares only for a relatively shorter sub-period spanning the 10-year period, 1980 to 1990. We discuss below our main findings regarding the relation between structural change and income inequality for each country group.

For the Asian economies, we argue that a particular structural characteristic of these economies may explain why inequality remained more or less unchanged in the bulk of these countries. This has to do with the role of the informal sector, which we discussed above. We argue that an important feature of structural change across Asia was the absorption of labour into the informal sector. As a result, even as workers in the lower income groups managed to secure employment in the non-agricultural sector, there was no appreciable rise in their incomes. As such the income gap between the poor and the rich did not alter significantly, which tended to leave overall income inequality in these economies relatively unchanged. There is indirect evidence in support of this hypothesis, from the limited data available on sectoral employment shares. Between 1980 and 1990, inequality remained relatively unchanged in the Asian economies. This period saw an

expansion of employment primarily in the service sector and it is a well documented fact that services have a large informal segment in developing countries the world over. However, even as we highlight the role of the informal sector, we do recognise that this was not the only factor affecting changes in the distribution of income in the countries in our sample. In particular the experience of countries such as China and Korea (where inequality was relatively low), in all probability, demonstrates the effectiveness of the government's redistributive policies.

Regarding the experience of the Latin American countries, we find that the increase in inequality over the 1980s decade could be attributed to the economic recession triggered off by the policies put in place in the wake of the debt crisis[10]. We argue that, but for the role played by the informal sector in these economies, the distribution of income could have become more unequal in the aftermath of the crisis. In these economies the informal sector, acting as a residual sector, tended to absorb the bulk of those who could not find employment (or who lost jobs) in the formal sector of the economy. There is evidence to show that in fact, the informal sector expanded across Latin America in the eighties decade (Turnham, 1993)[11]. In support of this argument we also have indirect evidence on sectoral employment shares, which shows a significant rise in the share of services in aggregate employment, on average, in the Latin American nations.

Basically the results from our regression analysis indicate that structural change, in terms of the process of industrial transformation of a developing economy, has played a somewhat minor role in explaining changes in income inequality. Regarding factors affecting income inequality, the explanation would seem to lie elsewhere. In particular our analysis points to the importance of the following set of factors, viz., growing importance of the informal sector in developing economies; economic adjustment to

[10] Prior to 1980, it is difficult to come to any clear cut conclusion regarding the exact nature of change in inequality in the Latin American countries, owing to a lot of missing observations on Gini coefficients in our data set. Comparing the earliest and the latest year for which data is available, what we can say is that basically, changes in inequality stayed within a narrow band for these countries until the 1980s decade.

[11] According to Turnham (1993), the share of the informal sector in Latin America rose from 40% in 1980, to 47% in 1985 and 55% in 1993. During 1983-89 employment in Latin America increased at an annual rate of about 3%, but a large proportion (almost 80%) of the new jobs were in the informal sector (own account workers, domestic service, micro-enterprises etc.).

exogenous shocks, such as the debt crisis in Latin America in the eighties; and redistributive government policies, such as land reforms. We have pointed out that existence of an informal sector can play an important role by affecting the way in which the process of structural change influences overall income distribution in a developing economy. The role of institutional factors, especially land reforms, becomes apparent when we compare the extent of inequality in the Latin American, vis a vis the Asian nations. In the former nations, on average, the distribution of income is far more uneven than in the Asian countries. It is true, that the inclusion of China, a communist country where government policy plays an important role in ensuring an even distribution of aggregate output, tends to lower average inequality for the Asian countries. However, even after excluding China, we find that income inequality across the Asian nations[12], particularly South Asia and Korea is significantly lower than for the Latin American nations. One of the reasons for this is that land reforms were not as successfully implemented in the Latin American nations as in the Asian countries of China and Korea. Also much of Asian (especially South Asian) agriculture is characterised by small land holdings, unlike the plantation-style agriculture in much of Latin America. The former makes for a more even distribution of agricultural incomes. This could be *one* reason underlying the large difference in inequality, especially within the agricultural sector, between the Asian and Latin American nations. Apart from these, the overall distribution of income is influenced and shaped by a number of other factors, such as, for example, the existing structure of asset ownership, the distribution of human capital and so on. It is not possible to include all such factors in the present study. However we do note that, for a number of reasons, historically income inequality has been much higher, on average, for the Latin American than for Asian countries.

[12] Within the Asian nations, income inequality is relatively higher among the South East Asian nations of Malaysia, Indonesia, Thailand and the Philippines, as compared to the rest of the countries included in our sample.

2.2 Results on International Trade and Structural Change Regarding the relation between international trade and the process of structural change in the economy, we find that in both the Asian and Latin American nations, both a larger volume of exports and of imports, are conducive to the process of industrial transformation of these economies. However our estimates indicate that the 'magnitude' of the impact of trade on structural change in much less for the Latin American nations, as compared to the Asian countries. We argue that to a large extent, this result reflects the role of the government in the former group of countries in regulating the composition of imports and exports.

Exports of a number of Asian countries, especially the South-East Asian nations in our sample and China, consist largely of manufactured goods, particularly, light manufactures such as garments, footwear, toys etc. This forges a direct link between exports and the process of industrialisation, which is probably what is reflected in our regression result. For the Latin American nations, in contrast, the bulk of exports for most of these economies consist of fuel and other primary commodities. As such it seems plausible to argue that exports do not directly affect the industrial sector as much as they would in the Asian economies. For these countries therefore, the magnitude of the impact of trade on structural change is much less. In this case, possibly the indirect effects of exports (operating via the foreign exchange earned through exports), has a positive impact on the process of industrialisation in the economy. One way this occurs could be by financing imports of inputs essential to the industrial process.

As for the result on the role of imports, we argue that this essentially reflects the role of the government in regulating imports. None of the countries in our sample followed a policy of free trade. Even though a number of Asian countries adopted policies of export-based industrialisation, almost all the countries had restrictions on the inflow of imports. In fact, only from the late 1980s decade were trade barriers dismantled in most of these countries, especially the South Asian nations and all Latin American nations except Chile. Our analysis covers only a relatively short period in the post-liberalisation phase. As such our regression results would tend to reflect the role of imports in the pre-liberalisation phase for these countries.

2.3 Implications for the Relation between Trade and Income Distribution In light of our result regarding structural change and income inequality, we can draw the following implications regarding the relation between international trade and income distribution for the countries in our sample.

For the Asian countries our regression results showed that an agriculture-industry transition (holding the share of the service sector in total output constant) is associated with relatively unchanging income inequality. While an agriculture-service transition (holding the share of industry in total output constant) is associated with rising inequality. Our results regarding trade and structural change show that a greater volume of trade is likely to reinforce the process of expansion of the share of the non-agricultural sectors, at the expense of the agricultural sector. Insofar as greater trade volumes are associated with an expansion of the industrial and service sectors, our regression results indicate that income inequality is likely to increase in such a situation. Another important point that emerges from our analysis is that how the industrial transformation of the economy affects income distribution is also influenced by the extent of labour absorption into the informal sector. Therefore how international trade affects the distribution of income will depend on how trade affects the *form* of labour absorption between the formal and informal sectors.

The regression results for the Latin American economies serve to bring out the importance of the overall economic conditions and policy regime within which we are analysing the factors affecting the overall distribution of income. In particular, rising inequality in the Latin American countries seems to have been directly affected by economic developments following the debt crisis and the government's policy responses to them. As such in inferring how trade is likely to affect income distribution, it is important to incorporate the likely feedback effects from the overall policy regime, before we can reach any conclusion regarding this. For instance, for the Latin American economies our econometric analysis suggests that a rise in the share of imports would be associated with a rise in the share of the non-agricultural sectors. However, this did not happen over the eighties and much of the nineties decades, when the share of industrial

value added in GDP actually declined, even as import shares rose. In all probability this is due to the recessionary impact of the policies introduced to deal with the eighties debt crisis that affected countries in this region.

In the final analysis it is important to recognise that our regression results cannot provide a definitive or conclusive answer the question, how does trade affect the overall distribution of income within an economy ? Rather our analysis provides certain insights into the factors that are likely to affect the way greater openness to international trade is likely to influence structural change and through this channel the distribution of income. Our results show that in analysing the impact of trade on income distribution, it is important to consider the structural characteristics of the economy and the overall policy framework (both short run stabilisation policies and long run policies that affect the overall institutional framework) within which the economy operates.

3 Conclusion

In this dissertation our objective was to examine whether the process of structural change is an important channel via which international trade affects the overall distribution of income in a developing economy. We attempted to provide an answer to this question in two parts. In the first part we studied the implications of structural change for changes in the personal distribution of income within an economy; and in the second, we analysed the link between international trade and the process of structural change. This exercise provided a few insights into the question of how international trade is likely to affect income distribution, via the channel of structural change.

The main finding from the first part of our analysis was that the process of industrial transformation does not have clear-cut implications for changes in the overall distribution of income, in the context of developing economies. This result runs counter to one of the main hypotheses in Kuznets (1955), viz., that the process of industrial transformation of

an economy is accompanied by increasing income inequality[13]. An underlying explanation for this could be linked to a particular structural characteristic, peculiar to developing economies, which was not discussed by Kuznets[14]. This relates to the existence of a sizeable informal sector, especially informal services in most developing countries. We argued that in the presence of an informal sector, even as labour moves from agriculture to the non-agricultural sectors, the overall distribution of income might actually remain unaffected. This is because wages in the informal sector are among the lowest in the economy; in fact most often wages in this sector are not much higher than rural wages. Therefore, movement of workers from agriculture to the urban informal sector primarily affects the bottom end of the distribution and may leave overall income inequality virtually unaffected. The other main finding from this part of our analysis was that, government policy can have an important impact on changes in the overall distribution of income. In this context we discussed the role of policies such as land reforms, that affect the institutional character of an economy and have long-term consequences. Also, we highlighted the role of policies geared to deal with the consequences of exogenous shocks like the debt crisis in Latin America, that primarily have short to medium term consequences.

In the second part of the analysis we explored the links between international trade and the process of structural change. Our basic premise here was that changes in (a) the composition of the total trade basket in terms of exports and imports and (b) the commodity composition of exports and imports, in terms of agricultural and non-agricultural goods, both have important implications regarding the effect of trade on structural change. The main result from our empirical analysis in this part was that a

[13]Essentially we are referring to the transition experience underlying the upward sloping arm of the inverted U-shaped Kuznets Curve, which is more relevant in the context of low and middle income developing nations.

[14] This is not surprising, for Kuznets's observations regarding the factors affecting personal income distributions were primarily based on the historical development experience of industrialised nations like the UK, USA and Germany. In these economies the growth of the service sector followed that of industry. However this pattern was not replicated in developing economies, where the service sector is important both in terms of its share in aggregate output and employment. Also informal services constitute a sizeable part of this sector. Unlike in developed countries, transition experience in developing economies often involves the movement of labour from agriculture into the service sector (particularly informal services), rather than into industry.

greater volume of trade (whether this is associated with a greater volume of imports or of exports) tends to reinforce the process of industrial transformation in the context of developing economies. We also found that trade liberalisation tends to be associated with a significant increase in the share of manufactures in both exports and imports.

To summarise our main results, we found that international trade tends to affect structural change in a significant manner, but we did not find clear-cut implications of structural change for changes in the distribution of income. Our analysis indicates that the impact of trade on inequality via the channel of structural change, would depend upon *inter alia*, certain structural characteristics of developing economies and on government policies – both, policies affecting long-run, institutional aspects of the economy and short-term stabilisation policies geared to deal with exogenous shocks. We would like to conclude by observing that perhaps it is not surprising that we find rather weak effects of structural change for income distribution. For, the economy-wide distribution of income is affected by the entire gamut of economic activity undertaken by residents of a nation during a given period of time. As such isolating the impact of a single factor or a single set of factors may be difficult, for their impact may not be immediately apparent in the aggregate data on income distribution.

Statistical Appendix on Panel Data

To estimate a relationship between variables using panel data, econometricians can use either (a) the pooled OLS estimater, or (b) the fixed effects estimator or (c) the random effects estimator. We discuss certain basic properties of each of these estimators in turn, where essentially we try to point out the basic differences between them[1].

Suppose we are given data on the set of variables X_1, X_2, ...X_k and Y, for N individuals (or economic units) over T years and the true model we wish to estimate is,

$$y_{it} = \beta x_{it} + e_{it} - - - - - (1).$$

where, β and x_{it} are $(k \times 1)$ column vectors. For the moment we make no assumptions about the behaviour of the error term e_{it}. In particular we do not impose the assumptions of the classical model.

We treat each individual as a group, viz., a group will comprise T observations for one individual (alternatively we could define a group to correspond to a year, with N group members for each year). We can stack all the NT observations on our dependent and independent variables, for example, in the following way :

Indiv 1, year 1
Indiv 1, year 2
Indiv i, year t
Indiv i, year t+1
.
.
.
Indiv N, year T-1
Indiv N, year T.
Thus, in matrix notation our model is,

$$y = X\beta + \varepsilon$$

[1]The following discussion is based on Baltagi (1995), Hsiao (1986) and Greene (1993).

where Y is $(NT \times 1)$, X is $(NT \times k)$, β is $(k \times 1)$ and ε is $(NT \times 1)$.

In this context x_{it} is just the transpose of one row of X. Assume that X does not contain a column of ones (no constant term).

We now examine how this whole stacked (or pooled) model may be estimated using each one of the three estimators discussed above.

The Pooled OLS Estimator

The procedure of minimizing the sum of squared deviations for the whole data is known as pooled ordinary least squares or simply pooled least squares. We can run ols over the pooled model described above and examine the properties of the ols slope estimate for b. The ols coefficient can be written as :

$$\hat{\beta} = (X'X)^{-1} X'y = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} x_{it} x'_{it} \right)^{-1} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} x_{it} y_{it} \right) - - - - - (2)$$

Next we define the following group means, i.e., means constructed by averaging the yearly values of the variables for each group (or individual) :

$$\bar{x}_i = \frac{1}{T} \sum_{t=1}^{T} x_{it}$$

$$\bar{y}_{it} = \frac{1}{T} \sum_{t=1}^{T} y_{it}$$

We can now decompose the least squares formula (2) in a useful manner. Consider first the 'numerator' in equation (2). By adding and subtracting group means, we obtain :

$$\begin{aligned} \sum_{i=1}^{N} \sum_{t=1}^{T} x_{it} y_{it} &= \sum_{i=1}^{N} \sum_{t=1}^{T} \left(x_{it} - \bar{x}_i + \bar{x}_i \right) \left(y_{it} - \bar{y}_i + \bar{y}_i \right) \\ &= \sum_{i=1}^{N} \sum_{t=1}^{T} \left[\begin{array}{c} \left(x_{it} - \bar{x}_i \right) \left(y_{it} - \bar{y}_i \right) + \bar{x}_i \left(y_{it} - \bar{y}_i \right) \\ + \left(x_{it} - \bar{x}_i \right) \bar{y}_i + \bar{x}_i \bar{y}_i \end{array} \right] - - (3) \end{aligned}$$

But note that:

$$\sum_{i=1}^{N}\sum_{t=1}^{T}\bar{x}_i\left(y_{it}-\bar{y}_i\right)=\sum_{i=1}^{N}\left(T\bar{x}_i\bar{y}_i-T\bar{x}_i\bar{y}_i\right)=0$$

$$and\ \sum_{i=1}^{N}\sum_{t=1}^{T}\left(x_{it}-\bar{x}_i\right)\bar{y}_i=\sum_{i=1}^{N}\left(T\bar{x}_i\bar{y}_i-T\bar{x}_i\bar{y}_i\right)=0.$$

Hence it follows that:

$$\sum_{i=1}^{N}\sum_{t=1}^{T}x_{it}y_{it}=\sum_{i=1}^{N}\sum_{t=1}^{T}\left[\left(x_{it}-\bar{x}_i\right)\left(y_{it}-\bar{y}_i\right)+\bar{x}_i\bar{y}_i\right]-----(4)$$

We can proceed similarly for the "denominator" of equation (2):

$$\sum_{i=1}^{N}\sum_{t=1}^{T}x_{it}x_{it}'=\sum_{i=1}^{N}\sum_{t=1}^{T}\left[(x_{it}-\bar{x}_i)(x_{it}-\bar{x}_i)'+\bar{x}_i\bar{x}_i'\right]------(5)$$

Therefore, the OLS estimator for β can be written :

$$\hat{\beta}=\left(\sum_{i=1}^{N}\sum_{t=1}^{T}\left[(x_{it}-\bar{x}_i)(x_{it}-\bar{x}_i)'+\bar{x}_i\bar{x}_i'\right]\right)^{-1}$$
$$\times\left(\sum_{i=1}^{N}\sum_{t=1}^{T}\left[\left(x_{it}-\bar{x}_i\right)\left(y_{it}-\bar{y}_i\right)+\bar{x}_i\bar{y}_i\right]\right)----(6)$$

This expression allows us to interpret OLS estimates in the context of panel data. We can define the following :

$$W_x=\frac{1}{T}\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{it}-\bar{x}_i)(x_{it}-\bar{x}_i)'=\text{variation in } x_{it} \text{ within groups.}$$

$$B_x=\frac{1}{T}\sum_{i=1}^{N}\sum_{t=1}^{T}\bar{x}_i\bar{x}_i'=\frac{1}{N}\sum_{i=1}^{N}\bar{x}_i\bar{x}_i'=\text{variation in } x_{it} \text{ between groups.}$$

$$W_{xy}=\frac{1}{NT}\sum_{i=1}^{N}\sum_{t=1}^{T}\left(x_{it}-\bar{x}_i\right)\left(y_{it}-\bar{y}_i\right)=\text{cov. of } x_{it} \text{ and } y_{it} \text{ within groups.}$$

$$B_{xy}=\frac{1}{NT}\sum_{i=1}^{N}\sum_{t=1}^{T}\bar{x}_i\bar{y}_i=\frac{1}{N}\sum_{i=1}^{N}\bar{x}_i\bar{y}_i=\text{cov. of } x_{it} \text{ and } y_{it} \text{ between groups.}$$

The "between covariation" measures the covariation of x_{it} and y_{it} between group means, while the "within covariation" measures the covariation of x_{it} and y_{it} within the groups themselves, after group means have been subtracted.The potential advantage of panel data is that we can use these two types of covariation to extract more information than we could when using simple cross-sections. Note also that OLS weighs "between" and "within" information equally. Equation (6) shows that the OLS estmate of β is computed by summing the between and withn sample covariations of x_{it} and y_{it} and 'dividing' this (in the matrix sense) by the sum of the within and between variations in x_{it}. So an equal weight is given to 'between' and 'within' information.

At this juncture, note that if the error term is correlated with the regressors xit, OLS will be biased, because the key assumption of the Gauss-Markov theorem, viz., $E(\varepsilon \mid X) = 0$ will be violated.

The Fixed Effects Estimator

The basic idea underlying the fixed effects estimator (FEE) may be introduced in the following way. We start by assuming that the data are iid (identically and independently distributed) across individuals. Now suppose the error term takes the following form[2]:

$\varepsilon_{it} = \alpha_{it} + \nu_{it}$ - - - - - - - (7)

In this case, the error term includes a component that is fixed for each indivieual over time, viz., α_{it}, and a component that varies for each individual and each year, viz., $\alpha_{it} + \nu_{it}$. By including the term α_{it} we are assuming that essentially the groups are heterogenous and each group is characterized by a specific unobserved effect.

We can think of α_{it} as an omitted variable from our equation, while ν_{it} is an error term which satisfies the usual assumptions of the classical model. Stacking the ν_{it}'s into an $(NT \times 1)$ vector ν, as before, we can write these assumptions as :

$E(\nu \mid X) = 0 \; ; V(\nu \mid X) = \sigma_{\nu}^2 I_{NT} \; ; E(\nu_{it}\nu_{js} \mid X) = 0, \; \forall \; j \neq i, \; s \neq t.$

We now allow the group-specific effect to be correlated with one or more of the regressors. Stacking the α_i's into an $(N \times 1)$ vector α, this assumption can be written as :

[2]Note that equation (7) is only one of many possible specifications for the error term.

$E(\alpha \mid X) \neq 0$; $V(\alpha \mid X) = \sigma_\alpha^2 I_N$; $E(\alpha_j \nu_{is} \mid X) = 0$, $\forall \ j, i, t$;
$E(\alpha_i \alpha_j \mid X) = 0$, $\forall \ j, i$.

If α_i is not correlated with a regressor, there would be no correlation between the error term and the regressor and there would be no bias induced by using pooled least squares. But as long as the error term is correlated with a regressor, as assumed above, there will be an omitted variable bias. Panel data allows us to deal with the omitted variable bias in a very straightforward manner.

Our true model (equation (1) above) can be rewritten :

$$y_{it} = \beta_{it}' + \alpha_i + \nu_{it} - - - - - - - - - (8)$$

For each group, we can write this equation in terms of group means :

$$\frac{1}{T}\sum_{t=1}^{T} y_{it} = \frac{1}{T}\sum_{t=1}^{T} \beta' x_{it} + \alpha_i + \frac{1}{T}\sum_{t=1}^{T} \nu_{it} - - - - - - - - - (9)$$

Subtracting equation (9) from equation (8), we obtain :

$$y_{it} - \bar{y}_i = \beta'(x_{it} - \bar{x}_i) + (\nu_{it} - \bar{\nu}_i) - - - - - - - - - - (10)$$

Note that the fixed effect ai has disappeared from this equation. The error term now conforms to the assumptions of the classical model, and in particular is uncorrelated with the regressors. So running OLS on this specification allows us to identify b and thus estimate it in an unbiased way. The OLS estimator of equation (10) can be written as :

$$\hat{\beta}^{FE} = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)(x_{it} - \bar{x}_i)' \right)^{-1} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)(y_{it} - \bar{y}_i)' \right) - - (11)$$

The subscript FE refers to the fixed effects estimator, a name which comes from the fact that α_i is fixed within groups (or more precisely that it is treated as if it were a fixed parameter). Note that OLS on equation (10) amounts to using only the within variation, and none of the between groups information. The bias problem came from the fact that we had an unobserved group-specific effect α_i ,which constituted an omitted variable. By taking differences from group means we get rid of this group-specific fixed effect and we are able to estimate the slope coefficient without bias.

Another way to obtain the same result is to consider that what equation (8) really says is that each group i has a distinct intercept, equal to α_i . So we can treat the group-specific effects as if they were fixed parameters, and estimate these. We deal with group-specific intercepts using dummy variables. By adding a dummy variable for each group in the equation, we should be able to account for all the variation corresponding to the fixed effect α_i thereby creating an unbiased estimate of β.

So we define the following N dummy variables :

$D_{it}^{j} = 1$ if $i = j$, that is, if observation 'it' belongs to group j $(j = 1....N)$
$D_{it}^{j} = 0$ otherwise.

We can then specify the following relationship:

$$y_{it} = \beta' x_{it} + \gamma_1 D_{it}^{1} + \gamma_2 D_{it}^{2} + ... + \gamma_N D_{it}^{N} + \mu_{it} - - - - - - (12)$$

where μ_{it} is an error term which satisfies the assumptions of the classical model.

It can be proved that running OLS on equation (12) produces exactly the same estimate of β as the fixed effects estimator described above.This procedure is known as least squares dummy variables - or LSDV. The intuition for this rsult is straightforward : both methods allow us to deal with the omitted variable, i.e. to get rid of the group specific effect. So there are two ways to reach the same result : either consider deviations from group means or include group-specific dummy variables in the regression. By adding N dummy variables, one loses N degrees of freedom which reduces precision in the estimation of the parameters. However at least this gets rid of the bias.

The Random Effects Estimator

Consider the case, where although the assumption of equation (7) is maintained [i.e., the error term is given by $\varepsilon_{it} = \alpha_i + \nu_{it}$], the group-specific effect is no longer correlated with the regressor, so that :

$E(\alpha \mid X) = 0$

Combined with the usual assumption that this implies $E(\nu \mid X) = 0$ that :

$E(\varepsilon \mid X) = 0$

We also retain all of the assumptions about the distribution of the error term components made above. Specifically, the data are iid across individual, α and ν are uncorrelated with each other, etc.

We call the group-specific effect α_i a random effect because we no longer need to treat it as if it were fixed and we can fully acknowledge the fact that it is part of the error term. Also when we run pooled least squares, we no longer have a problem from the standpoint of bias, because omitting the group effect α_i has no impact on estimates of the slope parameters in β.

However, we can see that the error terms $\varepsilon_{it} = \alpha_i + \nu_{it}$ are serially correlated. The errors for different time periods are correlated within groups, because α_i is the same for every time period. This constitutes a violation of one of the assumptions of the classical model, which requires the error terms to be independently distributed. Just like heteroscedasticity, serial correlation does not induce any bias in our estimates, but reduces the precision - or efficiency - with which we are able to estimate them using least squares.

The main intuition here is that since the error term is uncorrelated with the regressor, there may be some gain from using the between-groups information. This is the main idea behind the random effect estimator. The fixed effect estimator discarded all of the between information because it induced omitted variables bias. This came at the cost of a loss in degrees of freedom, i.e., a loss of precision in the estimates. In this case we do not have the bias problem because of our assumption on the error, so we can safely use some of the between information in order to increase efficiency (i.e. reduce standard errors on our estimates).But exactly how much of it do we want to use ? Since OLS weighs within and between variation equally and because OLS does not lead to efficient estimates in the presence of autocorrelation, we can already say that OLS will not generally be the optimal choice. The random effects estimator turns out to be a better choice in this case as we show below, it weighs the within and between information optimally. This is based on the procedure of GLS (generalized least squares) and produces unbiased and efficient estimates of β

We start with the simple econometric model :

$$y_{it} = \beta' x_{it} + \alpha_i + \nu_{it} \text{ - - - - - - - - - - (12)}$$

Stacking over all $i = 1, ..., N,\ t = 1, ..., T$, we have .

$$y = X\beta + \varepsilon - - - - - - (13)$$

where y, X *and* β are defined as before and :

$$\varepsilon = \begin{pmatrix} \alpha_{1i} \\ . \\ . \\ . \\ \alpha_{Ni} \end{pmatrix} + \begin{pmatrix} \nu_{11} \\ . \\ . \\ .\nu_{1T} \\ . \\ \nu_{N1} \\ . \\ . \\ \nu_{NT} \end{pmatrix}_{(NT\times 1)} \qquad - - - - (14)$$

To derive the random effects estimator we now proceed by steps :

Step 1. Form of the covariance matrix : As argued earlier, the assumptions about α_i and ν_{it} imply that

$E(\varepsilon \mid X) = 0$. To carry out GLS estimation we also need to know the form of the covariance matrix of the residuals. Now, $V(\varepsilon \mid X) = \Omega$, where

$$\Omega = \begin{pmatrix} \Sigma & . & . & 0 \\ . & . & . & . \\ . & . & . & . \\ 0 & . & . & \Sigma \end{pmatrix} = I_N \otimes S$$
$$(NT \times NT)$$

and

$$\Sigma = \begin{pmatrix} \sigma_\nu^2 + \sigma_\alpha^2 & \sigma_\alpha^2 & . & . & . & \sigma_\alpha^2 \\ \sigma_\alpha^2 & \sigma_\nu^2 + \sigma_\alpha^2 & & & & . \\ . & & & & & . \\ . & & & & & . \\ . & & & & & \sigma_\alpha^2 \\ \sigma_\alpha^2 & & . & . & \sigma_\alpha^2 & \sigma_\nu^2 + \sigma_\alpha^2 \end{pmatrix} = \sigma_\alpha^2 ii + \sigma_\nu^2 I_T$$
$$(T \times T)$$

This means that the individual effects α_i, because they do not vary across groups through time, generate some autocorrelation in each group's error term. This makes pooled least squares inefficient. However since the data are iid across individuals, there is no correlation in the error terms for two different individuals; this is captured by the 0's in the off-diagonal blocks of Ω.

Step 2. Solving for the GLS formula : We can now apply the GLS formula :

$$\hat{\beta}^{RE} = \left(X'\Omega^{-1}X\right)^{-1}X'\Omega^{-1}y = \left(X'(I_T \otimes \Sigma^{-1})X\right)^{-1}X'(I_T \otimes \Sigma^{-1})y - -(15)$$

We need a matrix $\Omega^{-\frac{1}{2}}$such that : $\Omega^{-1} = \Omega^{-\frac{1}{2}}\Omega^{-\frac{1}{2}}$. Such a matrix exists for Ω positive definite (it is, by definition of a covariance matrix). Then the model :

$$\Omega^{-\frac{1}{2}}y = \Omega^{-\frac{1}{2}}X\beta + \Omega^{-\frac{1}{2}}\varepsilon - - - - - - - - - - (16)$$

conforms to the assumptions of the classical linear model. As such OLS on the transformed model is BLUE.

Step 3. Interpreting the GLS formula : We can show that the GLS formula in equation (15) reduces to :

$$\hat{\beta} = \left(\left[\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{it} - \bar{x}_i)(x_{it} - \bar{x}_i)' + \theta\bar{x}_i\bar{x}_i'\right]\right)^{-1} \times \left(\left[\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{it} - \bar{x}_i)(y_{it} - \bar{y}_i) + \theta\bar{x}_i\bar{y}_i\right]\right) - - - (17)$$

Or :

$$\hat{\beta} = (W_x + \theta B_x)^{-1}(W_{xy} + \theta B_{xy}) - - - - - - (18)$$

where θ , a scalar, is the optimal weight given to the between-groups variation :

$$\theta = \frac{\sigma_\nu^2}{T\sigma_\alpha^2 + \sigma_\nu^2} - - - - - - (19)$$

(note that $0 \leq \theta \leq 1$).

We also saw, in the case of fixed-effects, that the within estimator could be written as :

$\hat{\beta}^{within} = (W_x)^{-1}W_{xy}$,that is, least squares on deviations from group means.

Similarly, we can define the between estimator as :

$\hat{\beta}^{between} = (B_x)^{-1}B_{xy}$,that is, least squares on group means.

Then we can rewrite equation (18) as :

$$\hat{\beta}^{RE} = (W_x + \theta B_x)^{-1}(W_x\hat{\beta}^{within} + \theta B_x\hat{\beta}^{between}) - - - - - -(20)$$

which shows that the random effects estimator is just a matrix-weighted average of the within and the between estimators, where the weight is determined optimally so that we use just the right amount of between information to ensure maximum efficiency.

Step 4. Interpreting θ : Once we have the formula for θ,we can examine what happens in various situations to the weight of the between information relative to the within information.

a. First, note that if the group-specific effect has a variance of exactly zero, then there will be no serial correlation in ε, and we should use pooled least squares. From equation (19) above it is clear that if $\sigma_\alpha = 0$, then $\theta = 1$ then we are treating within and between information equally, which is the case of pooled least squares.

b. Second, as the variance of the individual effect gets smaller relative to the variance of the observation-specific error term ν_{it}, so that $\frac{\sigma_\alpha^2}{\sigma_\nu^2} \to 0$, we should appraoch the case of pooled least squares. Indeed, in this case $\theta \to 1$.

c. Third, as the variance of the individual effect increases relative to the variance of ν_{it}, more weight will be given to the within estimator ; indeed as $\frac{\sigma_\alpha^2}{\sigma_\nu^2} \to \infty$, $\theta \to 0$.

Step5. Making GLS Feasible : The last issue we discuss is that so far, we assumed that we knew θ. In practice however, we will need to estimate it, and use FGLS rather than GLS. We can use pooled least squares and within estimation to get estimates for σ_α^2 and σ_ν^2. In turn, these could be employed to estimate the relative weight that the random effects procedure ascribes to

the between variation. As soon as we do this, we lose the exact results that we have for our random effects estimator (namely that it is BLUE). What we gt instead is consistency, asymptotic efficiency and asymptotic normality.

This concludes our discussion on panel data estimators.

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