INDUSTRIAL STRUCTURE AND LABOUR MARKETS: A STUDY ON PRODUCTIVITY GROWTH

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Approval of the Graduate School of Social Sciences

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This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Doctor of Philosophy in Economics.

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ABSTRACT

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This thesis aims to provide evidence on the relations between productivity, industrial structure, and labour markets for countries with different characteristics from 1965 to 1999. In order to do so, we first examine manufacturing industry production and trade with respect to both technology orientation and intensity, the impact of structural change on productivity growth, and the existence of convergence in industrial structures. Second, this study investigates the impact of labour market and industrial structures on aggregate productivity in manufacturing. While descriptive analysis of manufacturing industry with regard to technological orientation and intensity shows changing industrial structures in favour of relatively more technology intensive production and exports especially in fast growing countries, decomposition analysis suggests that the impact of structural change on productivity growth is negligible for most of the countries. The factor analysis revealed that although a general structural convergence tendency among countries is not observed, fast growing countries have converged their industrial structure towards those of industrialised countries. Finally, econometric estimation results also showed that while wage flexibility is detrimental to productivity in manufacturing, regulations in labour markets may foster productivity growth.

Keywords: productivity, industrial structure, technology, labour market regulation, wage differentials.

ÖZ

ENDÜSTRİYEL YAPI VE İŞGÜCÜ PİYASALARI: VERİMİLİLİK ARTIŞI ÜZERİNE BİR İNCELEME

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Bu tez 1965'ten 1999'a, farklı özelliklerdeki ülkeri inceyelerek, verimlilik, endüstriyel yapı ve işgücü piyasaları arasındaki ilişkiler üzerine bulgular sunmayı amaçlamaktadır. Bunu yapabilmek için, ilk olarak, imalat sanayii üretim ve ticaretini teknolojik yönelim ve yoğunluklarına göre inceleyip, yapısal değişikliğin verimlilik artışına bir etkisi olup olmadığını ve endüstriyel yapıların ülkeler arasında bir yakınsama gösterip göstermediğini araştırıyoruz. Bunlara ek olarak, bu çalışmada işgücü piyasası ve sanayii yapılarının imalat sanayiindeki verimliliğe etkisi araştırılmaktadır. İmalat sanayiinin teknolojik yönelim ve yoğunluklarına gore betimsel incelemesi, özellikle hızlı büyüyen ülkelerde endüstriyel yapıların daha teknoloji yoğun üretim ve ihracata doğru kaydığını gösterirken, "ayrıştırma analizi" (decomposition analysis) bulguları yapısal değişikliğin verimlilik artışına etkisinin bir çok ülkede önemsiz olduğunu göstermiştir. Faktör analizi sonuçları endüstriyel yapılarda genel bir yakınsama eğiliminin olmadığını, ancak hızlı büyüyen ülkelerin endüstriyel yapılarının zaman içerisinde endüstrileşmiş ülkelerin sanayi yapılarına benzeştiğini göstermiştir. Son olarak, ekonometrik kestirim sonuçları ücret esnekliğinin verimliliği azaltıcı, işgücü piyasaları ile ilgili düzenmelerin ise verimliliği artırıcı etkiye sahip olduğunu gösterdi.

Anahtar Kelimeler: verimlilik, endüstriyel yapı, teknoloji, işgücü piyasası regülasyonu, ücret faklılığı.

To my parents, my wife and my son.

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Usual disclaimer applies.

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CHAPTER I

INTRODUCTION

I. 1. Motivation

"Why growth rates differ". This is the title of a book published in 1967 by E. F. Denison and the main question that motivated this study. Denison titled his book with such a question phrase since it was a question both simple and too hard to answer directly for any economist.

There have been too many attempts to answer this question in the 20th century. Growth differentials of countries have been attributed to many factors from factor accumulation to idiosyncratic endowments. "*Productivity*" has always been at the core of these discussions. This study, therefore, investigates the relations between economic performance, measured as productivity, and the structure of manufacturing industry (technological structure of production and trade) and labour markets.

One of the first economists articulating the theory on "why growth rates differ" was Kaldor (Thirlwall, 2002: 41). For him, "it [was] impossible to understand the growth and development process without taking sectoral approach" (Thirlwall, 2002: 41). Kaldor proposed three laws on industrial growth, GDP growth and productivity growth:

> *The first law is that there exits strong causal relation between the growth of manufacturing output and growth of GDP. The second law states that there exists a strong positive causal relation between growth of manufacturing and growth of productivity in manufacturing as a result of static and dynamic returns to scale (this is also known as Verdoorn's law). The third law states that there exists a strong positive causal relation between the rate at which the manufacturing sector expands and the growth of productivity outside the manufacturing sector. (Thirlwall, 2002: 41-42)*

From this perspective, manufacturing industry and both its production and trade performance for any economy have turned out to be a vital source of aggregate growth. In the post-war period, therefore, studies usually focused on the evolution of manufacturing industry and the allocation of resources at the economy wide level. For Denison (1967: 321), for example, "a large part of the burden of explaining growth rate differentials" may be attributed to "gains from the reallocation of resources" ("almost exclusively labour").

Studies, however, on the link between growth/productivity and structural change until the last decade have focused on structural change at the economy wide i.e., movement of resources from non-industrial activities, especially agricultural activities, to industrial activities, especially manufacturing, the so-called three-sector hypothesis (Syrquin, 1984 and 1986; Chenery 1979; Chenery *et al*.,1986; Cornwall and Cornwall, 1994). Structural change at the most aggregate level, however, is important and contributes to both aggregate income and productive growth in the early stages of industrial development. At later stages of development, on the other hand, what becomes more important is the transformation of the internal structure of manufacturing industry and trade. Therefore, further productivity gains comes from allocation of resources within manufacturing i.e., movements of resources and production from low productivity to high productivity sectors.

Another source of productivity growth and competitiveness is the technological structure of manufacturing industry. There must be a strong relationship between technological structure of manufacturing industry and industrial development: the shift of production and trade from low technology, labour and resource intensive production towards high technology, specialised and science based production may well lead to fast and sustainable industrial development. In this sense, the convergence of industrial structures "suggests that the dominant forces that drive industrialisation consist of growing similarities in technology, preferences, and income levels rather than differences in factor endowments, institutions, history or geography" (Abegaz, 2002: 71).

Finally, labour market institutions and their functioning may have important consequences for the firms' innovativeness and productivity that, in turn, shapes the performance of an industry or an economy. Therefore, this study suggests that labour market institutions and their workings matter for productivity growth.

I. 2. Questions addressed

Several questions have motivated this study: The first of these if there is a relationship between industrial structure and economic performance with respect to both production and trade? There are a number of studies showing that the industrial structures of developed and less developed countries differ. Moreover, the change in the structure of manufacturing industry is a stylized fact in the path of industrialisation. Therefore, we asked two more specific questions: Does structural change in manufacturing industry lead to higher aggregate productivity growth? Second, does technological structure of manufacturing production and trade matter for industrialisation?"

On the industrial structure and economic performance nexus, we also looked for an answer to the following question: Is there a structural convergence or

divergence process among the countries with respect to both production and trade?

Finally, in order to contribute the controversy debate on labour market flexibility/rigidity vs. economic performance, we investigate whether labour market structure (labour market institutions and their workings) matters for productivity growth.

I. 3. The Data and Methodology

In this dissertation, we use a variety of data from different sources. The main data on manufacturing industry production and trade is derived from UNIDO-2002 Industrial Statistics Database at three digit ISIC level and UNIDO-2002 Demand Supply Database at four digit ISIC level. While the data used in this study cover the period from 1963 to 1999 for manufacturing production and employment, trade data were only available from 1981 to 1999. Moreover, trade data of few countries were not available although their production and employment data were. The most important of these countries were Ireland and China. We use also World Development Indicators (2002) of the World Bank for GNI series to classify countries with respect to their income level.

In order to construct the labour market regulation index, we use ILO Natlex Database (2002) in the chapter on labour market regulation and economic performance. In this chapter we also used the World Bank's Labour Market Flexibility index (2003) and the Labour Market Indicators of Rama and Artecono (2002).

For the methodologies, we first used decomposition analysis, or shift-share analysis, of growth accounting literature to find the effect of structural change on productivity growth. Factor analysis is used both to classify the countries with respect to their industrial structure and to investigate the evolution of structural

differentials among countries in Chapter 3. Factor analysis is also used in Chapter 4 to determine the correlated laws on labour markets and to reduce the number of subject groups of laws.

In investigating the impact of the industrial and labour market structures on labour productivity in Chapter 4, we use different econometric methodologies in the estimations of the productivity equations since there are both static and dynamic productivity models. The static models are estimated with standard *fixed-effects* model. For the estimation of dynamic productivity models, on the other hand, we apply the Ordinary Lest Squares (OLS) with country and time dummies (LSDV), "bias-corrected LSDV" (LSDV-C), and one-step GMM (Generalized Method of Moments) methods.

I. 4. Organisation of the Study

This thesis is organised as follows: Chapter 2 examines the structure of manufacturing production, employment, and trade with respect to orientations of industries for different country groups after a brief introduction on trends in the growth of manufacturing industry production, employment, productivity and trade. This chapter, then, investigates the impact of structural change on productivity growth of aggregate manufacturing industry.

In accordance with the Chapter 2, the third chapter, first, studies the evolution of technology intensity of manufacturing value added, exports, and imports. Second, this chapter searches for the existence of convergence/divergence in the structure of manufacturing industries with respect to both production and trade.

The link between the structure of labour markets and economic performance is studied in Chapter 4. In order to do so, first, a new labour market regulation index based on legislation on labour markets is constructed. We then analyse the relation between the labour market regulation and wages, productivity, and the

profit share in value added. Finally, the impact of both labour market regulation and industrial structure is examined.

The summary of the main findings and conclusions derived from them, and few policy implications are presented in the last chapter.

CHAPTER II

INDUSTRIAL STRUCTURE, STRUCTURAL CHANGE AND PRODUCTIVITY GROWTH

the challenge of narrowing income gaps with richer countries depends crucially on the creation of industrial sectors, along with related technological and social capabilities, in the context of the process of structural change that accompanies economic development. (Abromovitz, 1986 in UNCTAD, 2003: 92)

II. 1. Introduction

The importance of the dynamics in the structure[1] of an economic system and its performance has always attracted great attention of economists. This phenomenon is as old as economics itself and even goes back to Smith. As Smith (1776) pointed out a process of continual expansion presupposes changes in the structure of employment, especially a rise in the importance of productive work in relation to unproductive work (Singh, 2002: 2). From this point of view, this paper relates industrial structure and growth to the fact that the catching-up economies of the last decade, i.e., Korea, Malaysia, Ireland, Singapore and so on showed a dynamic industrial structure enabling further competitiveness and

[1] Structure is defined as a set of interconnecting parts of any complex unit. The unit in the context of economics, hence, would be the economy, sectors, industry at different levels of aggregation, and firms.

growth. Therefore, we argue that industrial structure and its evolution may well be one of the contributing factors in the process of industrial development.

In spite of the fact that the relationship between structure and performance was identified as early as in the late 18th century, it could not take a place in mainstream economic theorizing until the mid 20th century. The first formal analysis of structural change[2] was developed by Salter in 1960 (Singh 2002: 4). In his classical work, Salter suggested that "structural change obviously plays an important part in increasing productivity" (Salter, 1960: 155) because

> *structural changes originate in the uneven impact of technical change and associated economies of scale. Industries enjoying rapid rates of technical change and the realisation of economies of scale are able to achieve falling relative prices and high rates of increase of output. Less fortunate industries are not only unable to mach this performance but, depending upon their price and income elasticities of demand, may be faced with shrinking markets as the prices of substitute goods fall, and increasing labour costs as wage rates rise to meet the demand for labour of expanding industries. (Salter, 1960: 154).*

The aim of this chapter is to provide evidence on the relationship between industrial structure and performance and the development stage of economies since we suggest that the industrial structure and development are not independent of each other. Moreover, industrial development literature perceives structural change as one of the sources of productivity growth (Denison, 1967; Thirwall, 1999 and 2002; Chenery, 1979; Cheneary *et .al,* 1986; Cornwall and Cornwall, 1994). The reason behind this perception is the fact that there can be gains from factor reallocation if factors returns differ across industries[3] (Syrquin, 1984: 77). For this aim, this chapter, first, examines the structure of manufacturing industry with respect to its orientation for different economies descriptively. Second, we investigate the impact of the change in industrial

[2] Structural change, in the context of this study, refers to the change in the composition of manufacturing industry production (value added), employment, exports, and imports.

[3] However this does not necessarily mean that every factor reallocation brings about gains. In order for the gains to be realized, in our context, resources should move from low to high productivity sectors (Syrquin, 1984: 77).

structure on productivity growth in manufacturing in order to explain performance differentials of economies.

This study approaches structural change from a Schumpeterian perspective by arguing that the introduction of basic innovations and changing demand structures lead to a process of "creative destruction", in which industries associated with the old technologies decline and new activities and industries emerge and grow. Creative destruction here is nothing else than a structural change, i.e., changes measured by variations in the shares of sectors in output or employment. Verspagen (2000) examines the problem from the same perspective as well. However, he and many others do not concentrate on manufacturing industries but the change of the structure of overall economy, i.e. the three-sector hypothesis (see Fabricant, 1969).

Only few studies are available in the literature analyzing the structure of manufacturing sector and productivity growth (Timmer and Szirmai, 2000; Fagerberg, 2000 and Peneder, 2001). Although, all these works examine different country groups for different time periods, they all find no evidence of significant contribution of structural change on productivity growth. What makes these studies is different is the explanations they brought in on this phenomenon. While Fagerberg (2000), for instance, argues that electronic revolution and its positive spillover effects offset the direct contribution of structural change on productivity growth, Peneder (2001), on the other hand, states that structural change generates positive as well as negative contribution to aggregate productivity growth. However, since many of these effects net out, structural change on average appears to have only a weak impact.

The chapter is organised as follows: The next section provides a brief presentation of the growth of GDP, production, and trade in the World economy. Section 3 examines the long run trends in manufacturing industry production, employment, productivity, and trade. Section 4 elaborates the structure of

manufacturing industry production, employment, and trade with respect to orientations of industries for different country groups. Section 5 asses the impact of industrial structure and its evolution on aggregate productivity growth in the manufacturing industry. Finally, the last section summarizes the findings of this chapter.

II. 2. World Production and Trade

From 1965 to 2000, GDP of the World economy has grown about 3.5 percent per year on average (see Table II. 1). If the pattern of growth is examined before and after 1980, it is observed that growth of GDP is about two fold that in the pre 1980 period than post 1980. We found that manufacturing production of the World economy has shown a similar pattern with GDP growth. Especially in the post-1980 period, the growth rates of GDP and manufacturing production turned out to be almost the same.

Table II. 1: Summary statistics of world production and trade, 1965-2000.

	1965-2000		**1965-80**		**1981-2000**	
	Mean growth	Std. Dev.	Mean growth	Std. Dev.	Mean growth	Std. Dev.
GDP	3.522	1.758	4.486	1.977	2.750	1.094
Manufacturing Production	4.006	3.146	5.413	3.437	2.880	2.429
Manufacturing Trade	7.383	4.447	8.625	5.276	6.390	3.480

Source: WTO, (http://www.wto.org/english/res_e/statis_e/longterm_e.xls)

Trade statistics, on the other hand, has shown more increases during period under study as compared to production statistics (see Table II. 1). We found a 7.4 percent annual increase in manufacturing trade volume from 1965 to 2000. When two sub-periods are compared, trade statistics show about a 2 percentage points

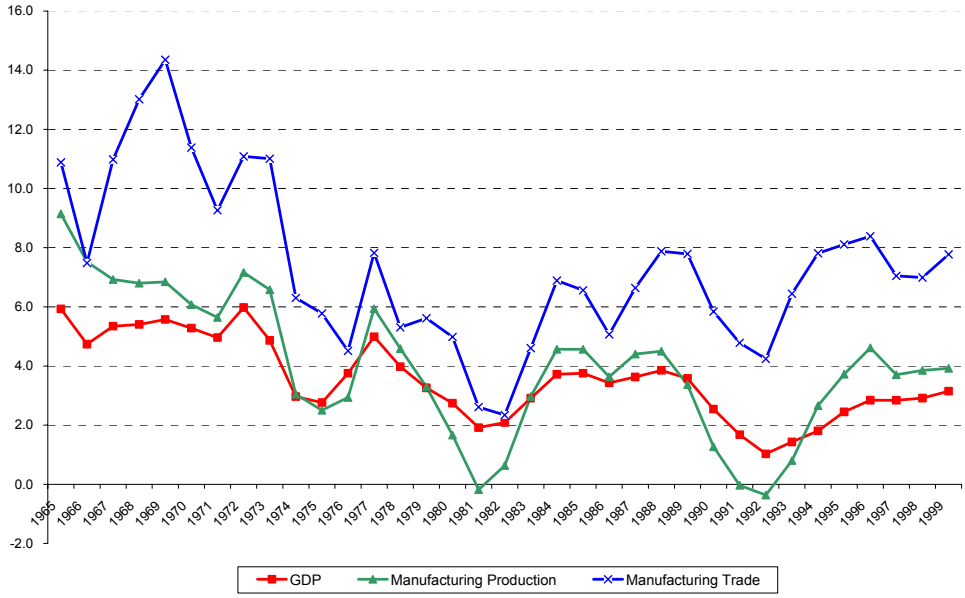


Figure II. 1. World GDP, production and trade growth rates, percentage changes, three-year averages, 1965-99.
Source: WTO, (http://www.wto.org/english/res_e/statis_e/longterm_e.xls)

decrease in the post-1980 period. However, growth rate of manufacturing world trade has always been larger than the production (about two fold).

The overall path that all statistics (GDP, production, and trade) followed is as follows: a decreasing rate of growth until the beginning of the 1980s, a boom period between the early 1980s and 1990s, a contraction till the mid-1990s, and finally expansion in GDP, production and trade in the second half of the 1990s (see Figure II.1). The Figure II.1 also shows that the growth rates of both production and trade figures converge to each other till the 1980s, this converging pattern change and diverge after the 1980s.

Finally, when the volatilities of production and trade are examined, it's seen that trade is more volatile than the production in all periods. If one was to compare the two sub-periods, it's seen that the volatilities of both production and trade decreases in the second sub-period.

II. 3. Trends in production, employment, and productivity

This section of the study presents the growth performance of industrial production, employment, and trade of different industries of manufacturing according to their orientations for different country groups[4,5] and Turkey from 1965 to 1999. In order to carry out such an analysis, we first classify the industries of manufacturing sector into five: resource-intensive, labour-intensive, scale-intensive, specialised-supplier, and science-based industries as proposed by OECD (1992) (see Appendix A for the classification of industries). In fact, this classification is based on the factors believed to effect competitiveness.

II. 3. 1. Growth of industrial production

Between 1965 and 1999, positive growth rates of manufacturing value added are observed in all country groups and different industries (see Table II. 2). During this period, the only industry which revealed no growth is the labour intensive industry of low income countries. The general implication of Table II. 2 is that, first, value added growth varies with income level and industry orientation. Second, growth performance of manufacturing value added slowed down dramatically in the post 1980 period as compared with pre-1980 period in all groups. Third, while relatively higher growth rates are recorded in either specialised-supplier or science-based industry in the high income country groups, the growth rates turned out to be almost no different for industries with different orientations in low income countries. Lastly, among the three income groups, while middle income countries have attained the highest value added growth, the lowest growth rates were recorded by the low income countries in all industries.

[4] Countries are grouped with respect to their Gross National Income (GNI) level in 1999 by using 2002 World Development Indicators Database of the World Bank. The groups are as follows: low income, $745 or less; middle income, $746-9205; and high income, $9206 or more.

[5] See Appendix B for country classifications.

In this period, not surprisingly, the highest growth rates for all industries with different orientations have been recorded by fast growing countries[6].

Examination of the growth rate of industrial production with different orientations shows that while almost similar and relatively low growth rates are observed in all industries in low income countries, the middle income countries have recorded higher growth rates in specialised-supplier and science based industries as compared with the other three industries. This is important in the sense that these industries are more technology intensive and productivity promising industries among the five industry groups. We found an exhibition of no growth in the whole period, even negative growth in the post-1980 period, by the labour-intensive industry of low income countries to be unexpected.

In the high income countries, differently from middle income countries, growth performance of specialised-supplier and science-based industries turned out to be much higher than the other three industries. Moreover, these countries recorded zero or negative growth rates in resource, labour and scale intensive industries between 1980 and 1999. On the other hand, middle income countries showed positive growth rates in these industries.

Growth performance of fast growing countries during the period under study was outstanding compared to the other country groups. These countries have achieved quite high growth rates especially in specialised-supplier and science industries (6.3 and 10.8 percent respectively) from 1965 to 1999 (see Table II. 2.). What is interesting is that the performance of these countries slowed down in the post-1980 period. The science-based industry annual average growth, for example, was about 20 and 6 percent in the pre- and post-1980 period respectively. This outcome, in fact, is consistent with the global trend.

The Turkish manufacturing industry performance was somewhere between the

[6] Fast growing countries are determined on the basis of growth performance of manufacturing value added in constant prices and include Indonesia, Ireland, Korea, Malaysia, Malta, Philippines, Singapore and Turkey.

Table II. 2. Average growth rates of manufacturing value added, employment, and productivity, 1965-99.

	Variable	Resource-intensive			Labour-intensive			Scale-intensive			Specialised-supplier			Science-based		
		65-99	65-79	80-99	65-99	65-79	80-99	65-99	65-79	80-99	65-99	65-79	80-99	65-99	65-79	80-99
LIC	*Value added*	0.003	0.004	0.002	0.000	0.005	-0.003	0.002	0.006	-0.002	0.014	0.021	0.008	0.027	0.044	0.016
	Employment	0.003	0.004	0.002	0.004	0.008	0.001	0.004	0.007	0.001	0.020	0.034	0.009	0.048	0.067	0.036
	Productivity	0.000	0.000	0	-0.004	-0.003	-0.005	-0.002	-0.001	-0.003	-0.005	-0.013	0.002	0.004	-0.002	0.008
MIC	*Value added*	0.003	0.005	0.002	0.005	0.009	0.002	0.006	0.009	0.004	0.032	0.052	0.016	0.056	0.093	0.033
	Employment	0.003	0.004	0.002	0.005	0.008	0.003	0.004	0.006	0.002	0.022	0.040	0.009	0.059	0.088	0.043
	Productivity	0.000	0.001	0	0.001	0.002	0.000	0.002	0.003	0.001	0.009	0.013	0.006	0.011	0.013	0.011
HIC	*Value added*	0.001	0.003	0	0.002	0.006	-0.001	0.003	0.007	0.001	0.018	0.027	0.011	0.037	0.055	0.024
	Employment	0.000	0.001	0	0.000	0.002	-0.002	0.001	0.003	-0.001	0.007	0.013	0.003	0.035	0.049	0.025
	Productivity	0.001	0.002	0.001	0.003	0.005	0.001	0.003	0.003	0.002	0.011	0.016	0.008	0.001	0.008	-0.003
FGC	*Value added*	0.006	0.006	0.006	0.012	0.018	0.008	0.012	0.012	0.011	0.063	0.077	0.054	0.108	0.198	0.057
	Employment	0.002	0.004	0.001	0.006	0.014	0.001	0.006	0.009	0.004	0.047	0.077	0.026	0.120	0.225	0.054
	Productivity	0.004	0.002	0.005	0.006	0.004	0.007	0.006	0.003	0.008	0.016	0.000	0.027	-0.005	-0.020	0.003
TR	*Value added*	0.005	0.005	0.005	0.006	0.006	0.006	0.009	0.011	0.007	0.051	0.067	0.040	0.057	0.137	0.001
	Employment	0.002	0.004	0	0.005	0.006	0.004	0.004	0.009	0.001	0.027	0.057	0.006	0.088	0.155	0.041
	Productivity	0.003	0.001	0.005	0.001	0	0.002	0.004	0.002	0.007	0.024	0.009	0.034	-0.031	-0.018	-0.040

Source : Industrial demand-supply balance database, Rev 2., 2002, UNIDO.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries); TR (Turkey).

middle income and fast growing country groups (see Table II. 2.). During the whole period, while the highest growth rate is recorded by science-based and specialised-supplier industry (annual average about 6 and 5 percent respectively), resource, labour and scale intensive industries recorded the lowest manufacturing value added increase: less than 1 percent annual growth. With respect to the growth patterns, in fact, the Turkish manufacturing industry shows quite similarities with the fast-growing countries during the whole period. Comparison of the two sub-periods, 1965-79 and 1980-99, suggests that the growth pattern of manufacturing industry shows differences with the other country groups to which Turkey belongs (middle income and fast growing country). The science-based industry growth of Turkish manufacturing industry, for instance, has almost stopped in the post-1980 period. In addition to this finding, the growth trend of labour and resource intensive industries did not change in the post-1980 period as compared to the pre-1980 period.

II. 3. 2. Growth of employment

Changes in the size of employment of manufacturing industry do not naturally follow very different patterns from the industrial production. In the whole period, we observed a more or less increase in employment in all different country groups and industries with different orientations except only for high income countries. In this group, in the longest period, we found the size of employment in resource and labour intensive industries to be constant (see Table II. 2). Furthermore, in this country group, labour and scale intensive industry employment have shrunk in the post-1980 period.

Our overall observation on manufacturing industry employment is that the employment creation in manufacturing industry has shown large decreases especially in post-1980 period in all industries (see Table II. 2). During the whole period, we found that the most significant contribution to employment came from specialised-supplier and science-based industries. Similar to the findings on

manufacturing value added growth, employment creation is seen the most in fast growing countries and middle income countries in all industries; i.e., 12 and 6 percent in science-based, and 5 and 2 percent in specialised-supplier industries respectively.

Turkish manufacturing industry employment during the period under study has shown similar pattern to that of other country groups. From 1965 to 1999, we found that highest employment growth is attained in the science-based industry. Differently from other country groups, in Turkey, contribution of labour intensive industry to employment creation has been relatively significant in all periods. We also found that the smallest employment growth is seen in the resource-intensive industry. Furthermore, the size of employment in this industry has not changed in the post-1980 period at all. When two sub-periods are compared, we come across different dynamics than the other country groups.

The finding of highest growth in both value added and employment in science based industry in all country groups and Turkey requires one clarification: Quite high growth rates in this industry, especially in low, middle, and fast growing country groups may, in fact, be a result of "base-effect" in the sense that additions to both value added and employment of science-based industry may generate high growth rates due to its small share in total manufacturing (see Chapter III for the shares of industries with different orientations).

II. 3. 3. Labour productivity growth

The findings on the productivity[7] growth in manufacturing industry give different but unexpected outcomes when it's compared according to income groups during the period under study. Moreover, differences among country groups are much clearer as far as productivity growth is concerned.

[7] In this study, productivity refers to labour-productivity and is measured as the value added per employee.

Not surprisingly, productivity in manufacturing industry of low-income countries has been extremely low in all five categories of industries with different orientations during the period under study (see Table II. 2). In this country group, furthermore, while labour productivity has not changed in resource-intensive industry, it decreased in labour, scale and specialised supplier industries from 1965 to 1999. When two sub-periods are compared, we found that the decrease in labour productivity in labour and scale intensive industries is higher in the post-1980 period. In specialised-supplier and science based industries, on the other hand, labour productivity shows decrease in the pre-1980 and increase in the post-1980 period.

The middle income country group is the only group that showed no productivity decrease in any industry from 1965 to 1999. We found significant productivity increases especially in specialised-supplier and science-based industries. In the other three industries of this country group, on the other hand, either small productivity increases (scale and labour intensive industries), or no increase (resource-intensive industry) is observed during the whole period.

Similar to the middle income countries, high income countries have shown productivity increases in all industries from 1965 to 1999. What is interesting is that the decrease in productivity in the science-based industry of this country group in the post-1980 period.

In Turkish manufacturing industry, the highest productivity growth is observed in specialised supplier industries from 1965 to 1999 (about 2.5 percent). We also found that the increase in labour productivity in these industries is quite high in the post 1980 period (3.4 percent). What is disappointing is the productivity performance of science based industries: about 3 percent decrease in productivity from 1965 to 1999. We also found that the tendency in decreasing productivity is stronger in the post 1980 period. Trade liberalisation efforts of 1980s, therefore,

did not help in increasing productivity in science based but specialised supplier industries in Turkish manufacturing.

II. 3. 4. Trends in trade

Trade performance of economies is important to the extent that if the composition of exports of an economy matches the changing composition of world imports, then exportation for that country will not necessitate a destructive competition to maintain its share in a diminishing market. Descriptive statistics on manufacturing trade by industry orientations reveals that growth of trade has been larger than both manufacturing production and employment (see Table II. 3). What is more important is that the differentials in the performance, especially exports, of different industries from 1981 to 1999. We found that the least growth is observed in resource intensive industries in all country groups. The largest growth rates in trade, on the other hand, have been observed in specialised-supplier and science-based industries.

Export performance in labour and scale intensive industries varies among different country groups: While exports of labour-intensive industries grew quite high in fast growing countries (about 2 percent annual), labour intensive exports of high income countries grew about 0.6 percent per year from 1981 to 1999. The largest growth in scale intensive industry exports is recorded by fast growing and middle income countries (1.4 and 1.2 percent per year respectively). In fact, the exports of the manufacturing industry of fast growing country groups recorded the highest growth rates in all industries with different orientations. This finding may indicate that fast growth need not be associated with increasing specialisation. Growth in all industries accompanied with specialisation in specific industries (more technology, scale, specialised industries) may be more crucial for industrial development. The records of 9 and 16 percent annual growth of exports of specialised-supplier and science-based industries, thereby, may not be coincidence.

Table II. 3. Average growth rates of manufacturing exports and imports, 1981-99.

	Variable	Resource-intensive	Labour-intensive	Scale-intensive	Specialised-supplier	Science-based
LIC	*Exports*	0.004	0.017	0.008	0.039	0.103
	Imports	0.006	0.011	0.005	0.033	0.067
MIC	*Exports*	0.004	0.013	0.012	0.059	0.119
	Imports	0.003	0.010	0.006	0.028	0.049
HIC	*Exports*	0.004	0.006	0.008	0.039	0.108
	Imports	0.004	0.010	0.008	0.041	0.075
FGC	*Exports*	0.008	0.021	0.014	0.088	0.162
	Imports	0.006	0.011	0.009	0.059	0.101
TR	*Exports*	0.007	0.022	0.018	0.092	0.223
	Imports	0.007	0.022	0.012	0.056	0.143

Source: Industrial demand-supply balance database, Rev 2., 2002, UNIDO.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries); TR (Turkey).

Export performance of the manufacturing industry of Turkish economy has been outstanding from 1981 to 1999. The growth of Turkish manufacturing industry exports has been larger than the other country groups including fast growing country group in all industries with different orientations. More importantly, the growth performance of Turkish manufacturing industry in specialised supplier and science based industries has been very promising (9 percent in specialised supplier and 22 percent in science based industries) despite the base-year effect.

We found that evaluation of imports for different country groups is quite similar to that of exports. Import structure with respect to orientation of industries may have consequences for industrialisation because imports, to some extent, are methods of technology transfer. As in the case of exports, we found that specialised supplier and science based industry imports are the highest in fast growing countries and Turkey (about 10 and 14 percent respectively).

II. 4. The Structure of Production, Employment and Trade

This section of the study presents the structural evolution of industrial production, employment, and trade according to their orientations. The reason for analysing the manufacturing industries with respect to industrial orientations is the fact that competitiveness, and thereby, performance of economies may well be determined by the industrial structure.

II. 4. 1. Manufacturing industry production

The structure of manufacturing industry production is depicted in Figure II. 2 for different income groups, Turkey, and China[8]. Our analysis shows that the lion

[8] China is included in the analysis due to its importance in the World production and trade even though its manufacturing industry data does not cover the whole period under study: its manufacturing production and employment series starts in 1980 and 1977 respectively. The data on manufactured goods trade were not available at three digit ISIC level.

share of manufacturing value added is produced by the resource-intensive industries for all income groups in the period of 1965 to 1999. While about more than the half of the manufacturing value added is produced by the resource intensive industries in low and middle income countries, the shares of manufacturing value added produced by the resource intensive industries in high income country group are about 35-40 percent during the period under study (see Figure II. 2). What is interesting is the finding that the share of this industry in all country groups remains quite stable from 1965 to 1999. Only in low income countries, the share of resource-intensive industry rose by about 10 percentage points in the 1990s.

The structure of manufacturing industry production shows very close similarities in the groups of low and middle income countries. The share of scale-intensive technology oriented production in these two groups is between 20-25 percent from 1965 to 1999. The only difference is that while there is a slight up-ward/down-ward trend in the shares of scale and labour intensive industries in low income countries, the shares of these industries in the middle income countries remained relatively stable during this period. This finding, in fact, is not consistent with our expectations. The reason for this outcome is that both the number of countries in low income group is small relative to middle income countries and there are countries that have relatively mature industrial base but low income-per-capita income i.e., Indonesia, and India.

From 1965 to 1999, we observe that the share of specialised-supplier manufacturing production in total production shows quite significant differences for different income groups. While specialised-supplier production is about 5 percent in low and lower-middle income groups, this ratio is about 10 percent in upper-middle and 20 percent in high income countries at the end of the period. The other significant difference among the various income groups is about the trend of specialised-supplier production during this period. While specialised-supplier manufacturing production has an almost constant trend in low income countries, an increasing trend is observed in the other three income groups.

However, the increase in specialised-supplier production is quite negligible in lower-middle income countries. On the other hand, the share of specialised-supplier manufacturing production has increased to 11 percent and 20 percent from 6 percent and 12 percent in upper-middle and high income country groups respectively. This outcome allows us to conclude the following: There is a positive relationship between specialised-supplier manufacturing production and income level. In other words, as economies develop, an increase in the share of specialised-supplier production in total manufacturing industry production should be expected.

The difference in the structure of manufacturing industry is more significant when scale-intensive industry is concerned. We .found that the share of this industry is high with an increasing trend as compare to the other two income groups from 1965 to 1999. On the other hand, there is no much difference in scale-intensive industry production with the other income groups.

One other observation on the share of manufacturing industry production by technology orientations is the outcome of extremely low ratio of science- based technology oriented manufacturing production almost for all country groups. While this ratio is very close to zero for low and lower-middle income countries between 1965 and 1999, it's about 1 and 2 percent for upper-middle and high income country groups respectively. In fact, the science-based technology oriented manufacturing industry production is underestimated because of some measurement errors. The main measurement error is that some of the science-based technology oriented manufacturing industry production measured at the 4-digit ISIC level is accounted in the specialised-supplier production at the 3 digit ISIC classification. Therefore, while the figures underestimate the science-based technology production, they also over-estimate specialised-supplier production.

Production figures belonging to fast growing seven countries are quite different and interesting. The figures show drastic changes in the structure of manufacturing production in the fast growing counties from 1965 to 1999. In

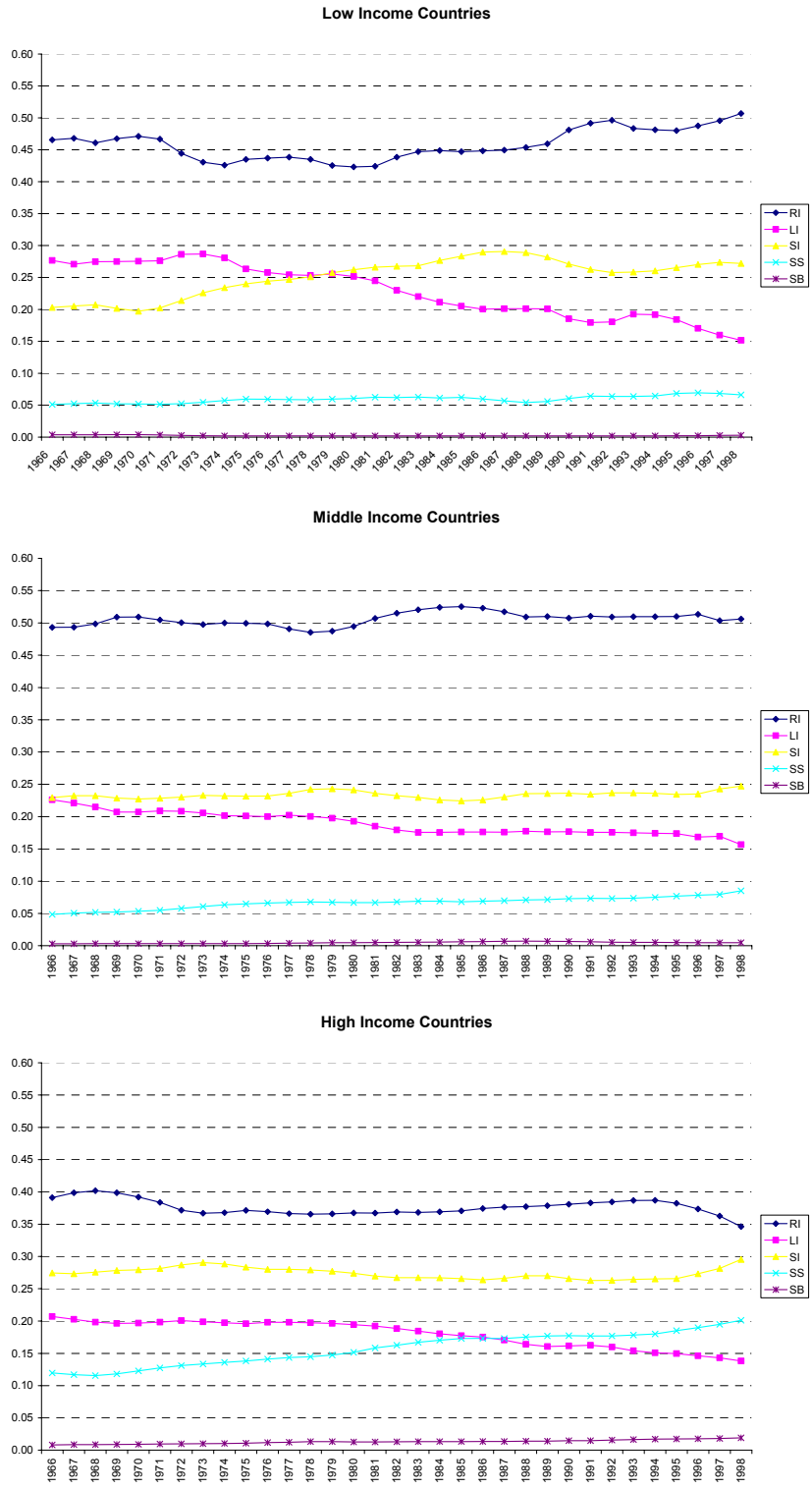


Figure II. 2. Distribution of manufacturing value added by technology orientations for different country groups and Turkey, 1965-99.
Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: RI(resource-intensive), LI(labour-intensive), SI(scale-intensive), SS(specialised-supplier), SB(science-based).

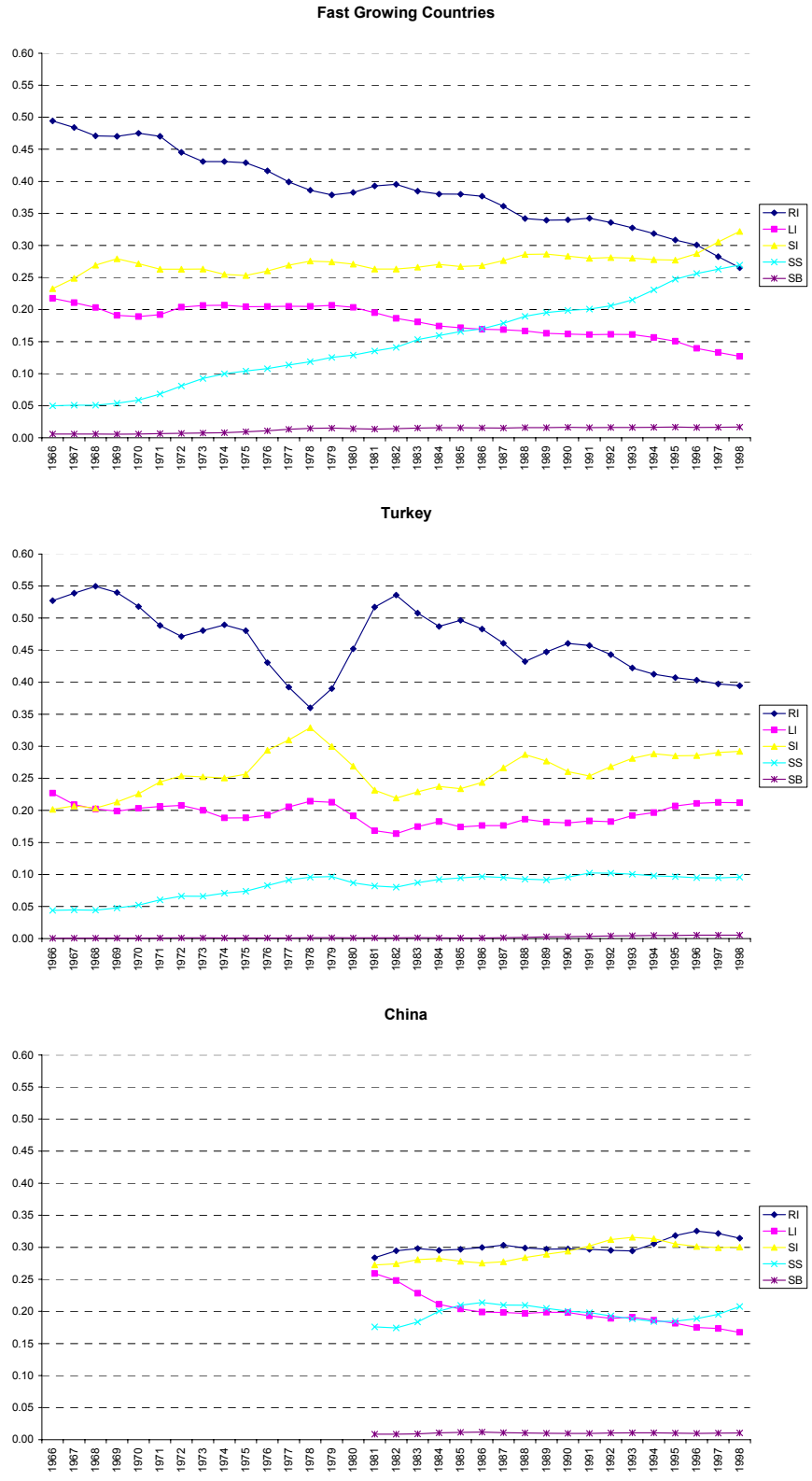


Figure II. 2. (cont.) Distribution of manufacturing value added by technology orientations for different country groups and Turkey, 1965-99.

Source : Industrial Statistics Database, Rev 2., 2002, UNIDO.

Legend : RI(resource-intensive), LI(labour-intensive), SI(scale-intensive), SS(specialised-supplier), SB(science-based).

Figure II. 2, although the share of labour and scale-intensive productions remain to be stable, resource intensive industry production decreases to 35 from 50 percent and specialised-supplier production increases to about 23 from 5 percent during the period under study. This outcome shows us how the structure of manufacturing industry changes during fast economic growth, or *vice versa*. At this point, the question to be answered is the following: "Does economic growth result in structural change in manufacturing industry, or structural change leads to economic growth?".

The first impression on Turkey's manufacturing industry is its highly volatile structure during the study period. Furthermore, the pattern of structural changes of manufacturing production does not resemble to the fast growing countries' production patterns. From the figures, we find out that there are three distinct periods. The first period is pre-80 period in which the share of resource-intensive production in total manufacturing decreases to around 35 from 55 percent, and scale-intensive technology oriented manufacturing industry production share increases to 35 from 20 percent. The other three categories of production remain to be steady in the first period. After 1980, while resource-intensive manufacturing production increases, the share of both scale and labour-intensive production decreases till mid-1980s. Then, an increase in the scale-intensive production and decrease in the resource-intensive production starts. From 1965 to 1999, while the share of science-based technology oriented production does not change at all, specialised-supplier production exhibits only a 5 percentage points increase in share. During this period, despite its volatile structure, the share of labour-intensive technology oriented manufacturing industry production does not change.

II. 4. 2. Manufacturing industry employment

When the structure of manufacturing employment examined, we found that the differences among different country groups are greater compared to the case of

production. While the resource-intensive industries have the largest share of total manufacturing employment in middle and high income countries, in low income countries resource and labour intensive industry employment are about the same and have the highest share in total manufacturing employment. Figure II. 3 implies that employment structure has not changed significantly in low and middle income countries but high income countries from 1965 to 1999. In the high income country group, from the beginning of period to the end of period, labour intensive industry employment has decreased on the one hand; specialised supplier industry employment has increased on the other.

The most pronounced changes in the structure of manufacturing employment are seen in the fast growing country group during the period under study (see Figure II. 3.). While resource and labour intensive industry employment shrinks drastically, the share of specialised-supplier industry employment increased five folds in 35 years. Only scale and science-based industries remained to be stable in the period under study.

Turkey's figures are not similar to that of both fast growing and middle income country groups. In fact, Turkey, in this study, is classified as a middle income and fast growing country. We found that the employment shares of scale, specialised-supplier, and science-based industries in total manufacturing remained stable form the beginning of the 1970s to the end of period.

There are two industries showing changes in this period in Turkish manufacturing: labour and resource intensive industries (food, beverages, textiles and so on). While the share of resource-intensive industry employment decreases from 1965 to 1999, labour intensive industry employment increased. These changes came out especially in the 1980 and 1990s. That may be attributed to Turkey's trade liberalization and export-led industrialisation policies adopted in the beginning of the 1980s.

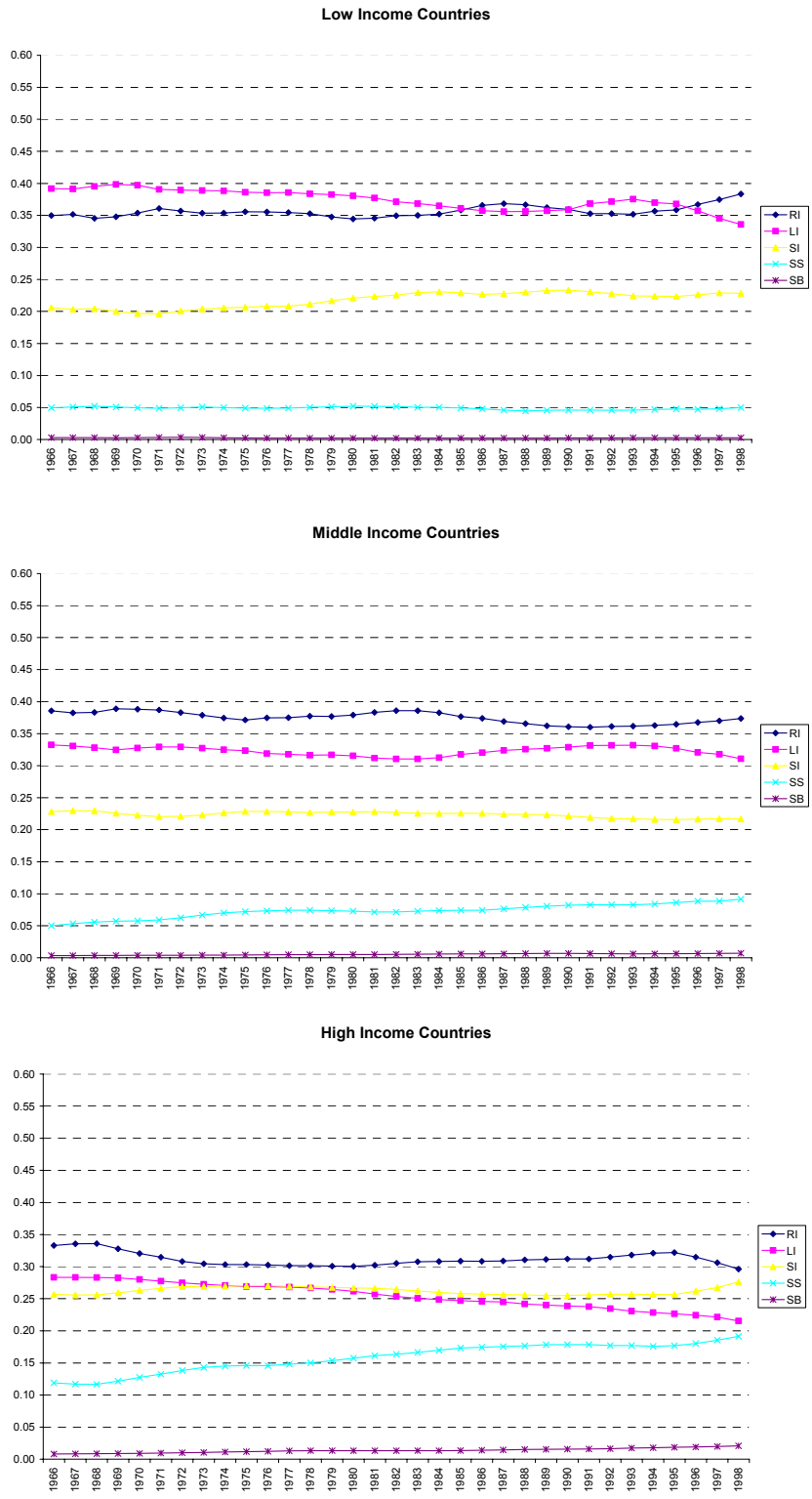


Figure II. 3. Distribution of manufacturing employment by technology orientations for different country groups and Turkey, 1965-99.
Source : Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend : RI(resource-intensive), LI(labour-intensive), SI(scale-intensive), SS(specialised-supplier), SB(science-based).

Figure II. 3. (cont.) Distribution of manufacturing employment by technology orientations for different country groups and Turkey, 1965-99.

Source : Industrial Statistics Database, Rev 2., 2002, UNIDO.

Legend : RI (resource-intensive), LI(labour-intensive), SI(scale-intensive), SS(specialised-supplier), SB(science-based).

II. 4. 3. The Structure of Foreign Trade

II. 4. 3. 1. Exports structure

Export structure with respect of industry orientations show significant differences among income groups (see Figure II. 4.). We found that, in the low-income country group, the lion share of exports is made by labour-intensive industries. The contribution of labour intensive exports to total manufacturing exports is more than 40 percent after mid-1980s. This is followed by resource and scale intensive industries in this group. The trend of these industries' exports is not different than the other income groups: There is decreasing share of resource-intensive industry exports and relatively stable scale-intensive industry exports. However, differently from the other groups, the volume of specialised-supplier industry exports constitutes only about 5 percent of total manufacturing exports during the whole period and stays relatively constant in the low-income countries.

The figures show that export structure of high income country group is much different from the other two groups. In this country group, more than 30 percent of manufacturing exports is made by scale-intensive industries especially in the 1990s. While the share of resource-intensive industry exports is not different than low and middle income countries, the share of specialised-supplier industry exports is remarkable (about 25 percent in the late 1990s). Contrary to the other groups, labour intensive industry exports show a slightly decreasing pattern in the 1990s. Finally, in this country group, there is small amount of share increase of science-based industries.

The change in export structure of fast growing countries is striking during the period under study. In the group of these countries, while a relatively stable labour and scale intensive exports is observed, a sharp decrease in resource intensive exports and increase in specialised-supplier exports have been witnessed. The exports structure of fast growing countries is totally different than

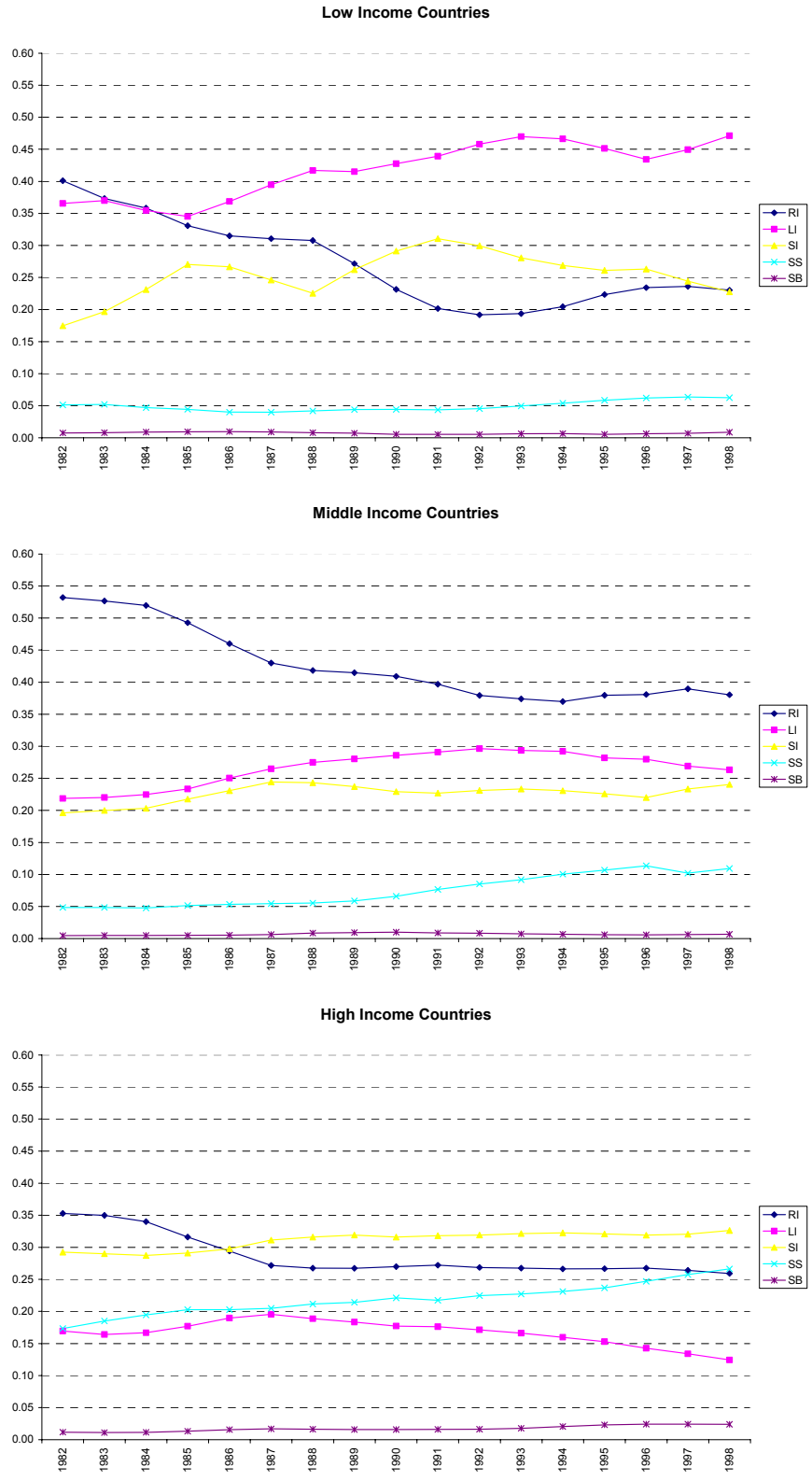


Figure II. 4. Distribution of manufacturing exports by technology orientations for different country groups and Turkey, three year averages, 1981-99.

Source : Industrial demand-supply balance database, Rev 2., 2002, UNIDO.

Legend : RI (resource-intensive), LI (labour-intensive), SI (scale-intensive), SS (specialised-supplier), SB (science-based).

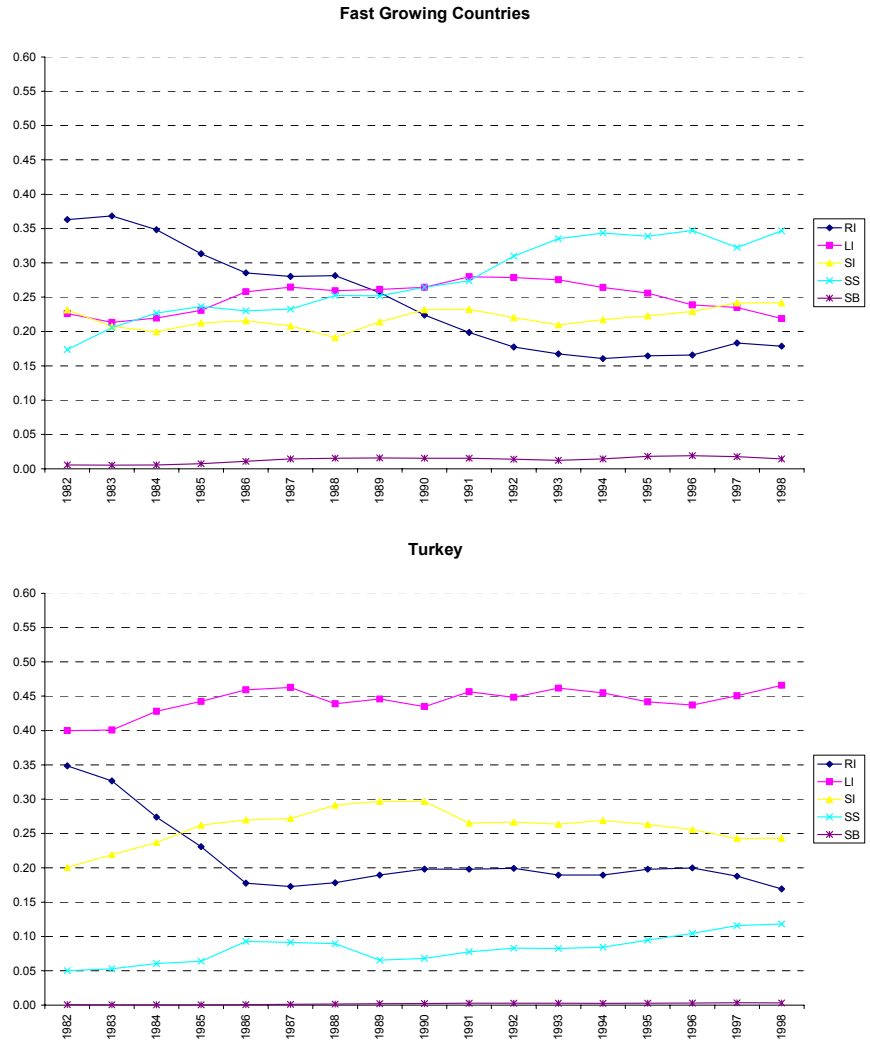


Figure II. 4. (cont.) Distribution of manufacturing exports by technology orientations for different country groups and Turkey, three year averages, 1981-99.

Source : Industrial demand-supply balance database, Rev 2., 2002, UNIDO.
Legend : RI (resource-intensive), LI (labour-intensive), SI (scale-intensive), SS (specialised-supplier), SB (science-based).

the other groups such that about 40 percent of exports is made by specialised-supplier industry after 1990s. Note that specialised-supplier industry is not only the most technology intensive industry but also an industry recording highest productivity increases and employment creation among other industries (see previous section).

As a developing country, Turkey's export composition is a mix of low and middle income country groups. Figure II. 4 also reveals that its export structure is totally different than the fast growing country group. Turkey's resource-intensive exports sharply decrease from the beginning of period to mid-1980s. Then it becomes stable around 20 percent. With regard to export structure, in fact, the most significant difference of Turkey than all of the other groups but low income countries is extremely high share of labour-intensive industry exports. From 1981 to 1999, about 45 percent of Turkey's exports have been made by labour-intensive industries. During this period, scale-intensive exports has followed no significantly different pattern than the middle income and fast growing countries. However, while specialised-supplier exports consists of a large ratio of total exports with its continuing increasing trend in the fast growing country group, Turkey's specialised supplier exports can only reach 10 percent at the end of the period from 5 percent of starting value at the beginning of 1980s.

II. 4. 3. 2. Imports structure

Naturally, the structure of imports is quite different than that of exports. Our findings presented in Figure II. 5 suggest that the structure of imports does not show very large differences among different country groups. For example, about two third of manufacturing industry imports consist of scale-intensive industry imports for all groups classified by their income. From 1981 to 1999, while science-based industry imports stayed at around 2-3 percent of total imports, the second smallest imports share is observed in the labour intensive technology orientated industries for all different country groups. However, the share of labour-intensive imports has exhibited differences among country groups.

The specialised-supplier imports fluctuate between 20 and 30 percent in all income groups as well. On the other hand, the trend of this kind of imports showed differences in different country groups. While the specialised-supplier industry imports has a decreasing trend in the low-income group, in the other

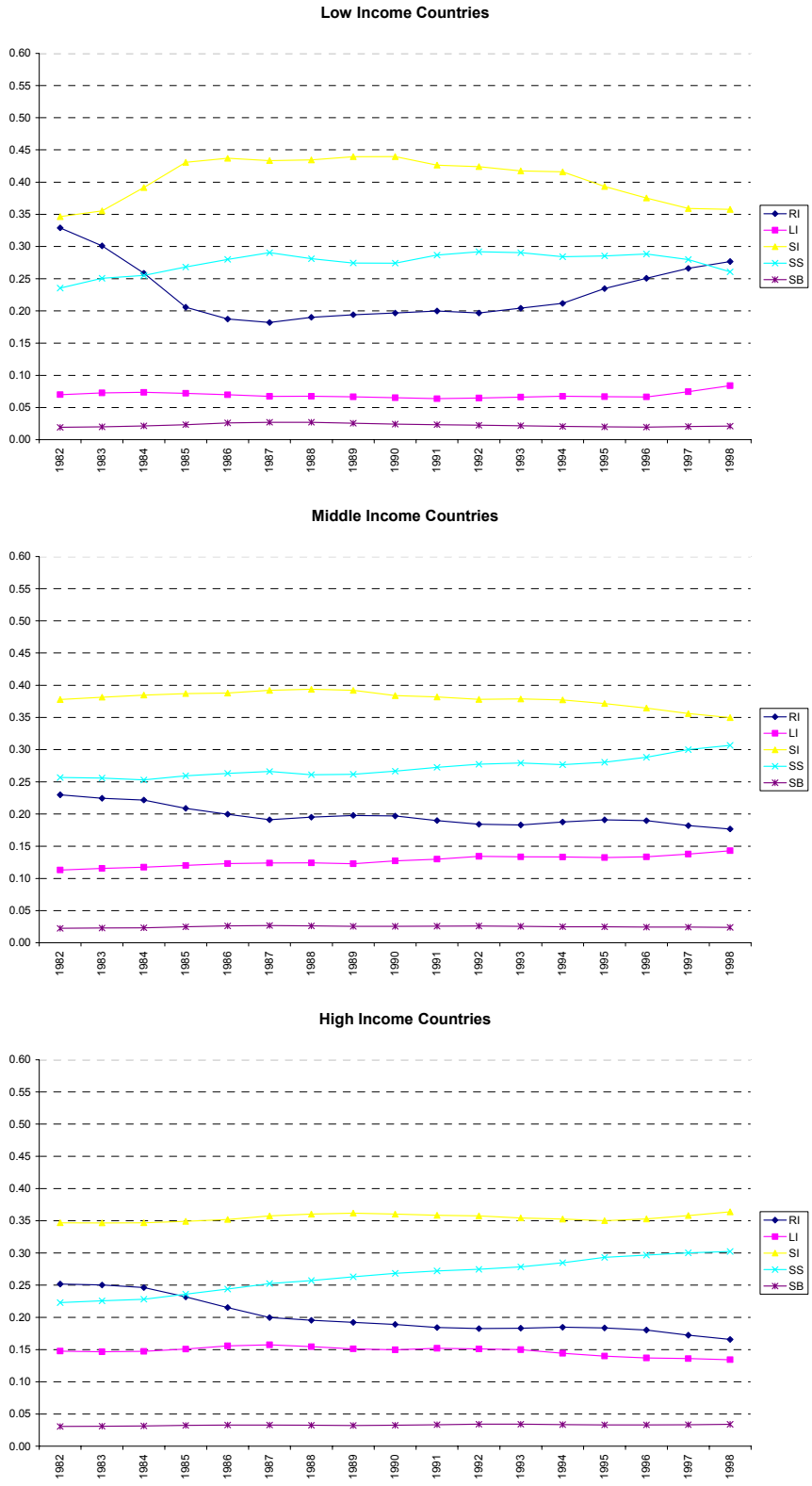


Figure II. 5. Distribution of manufacturing imports by technology orientations for different country groups and Turkey, three year averages, 1981-99.

Source : Industrial demand-supply balance database, Rev 2., 2002, UNIDO.

Legend : RI (resource-intensive), LI (labour-intensive), SI (scale-intensive), SS (specialised-supplier), SB (science-based).

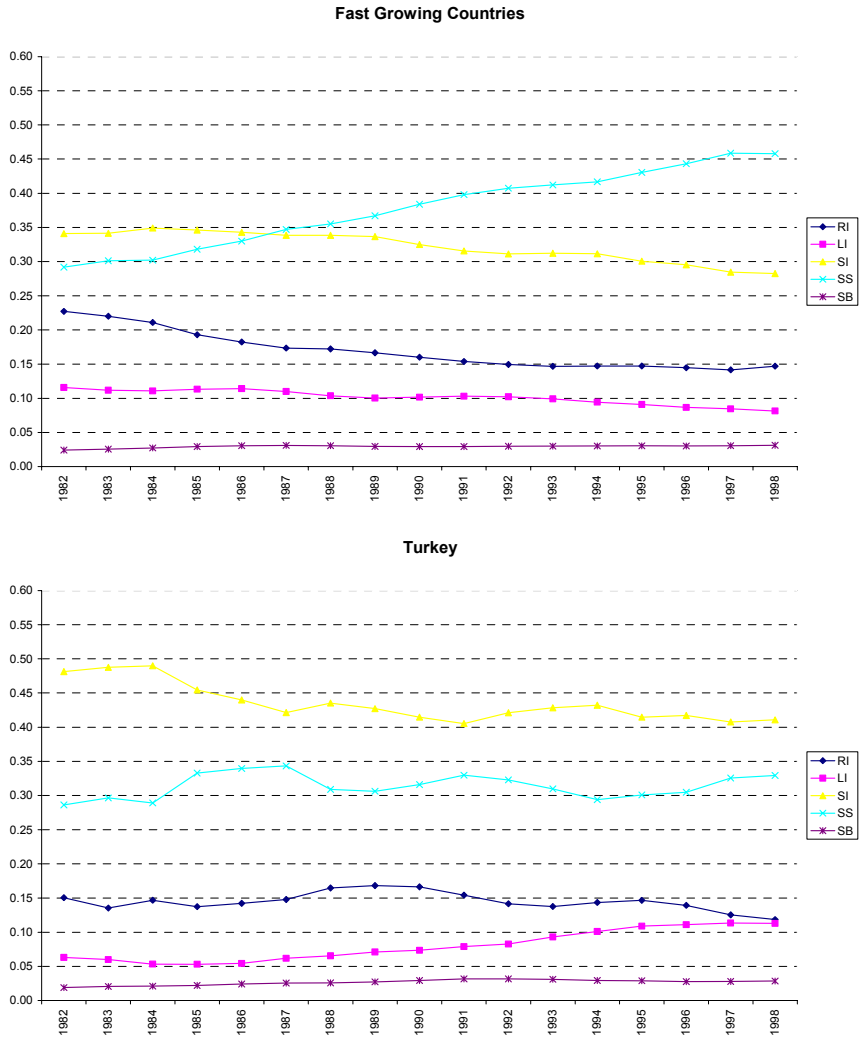


Figure II. 5. (cont) Distribution of manufacturing imports by technology orientations for different country groups and Turkey, three year averages, 1981-99.

Source : Industrial demand-supply balance database, Rev 2., 2002, UNIDO.
Legend : RI (resource-intensive), LI (labour-intensive), SI (scale-intensive), SS (specialised-supplier), SB (science-based).

income groups specialised supplier imports increased more or less during this period. The reverse of this situation is seen in the resource-intensive industry imports. While the share of resource-intensive imports in total imports is decreasing in all income groups, an increase in the resource intensive imports is recorded after mid-1980s. As always, the fast growing countries have different import structure according to different technology orientations. For example, in

no other country groups, more than 40 percent of total imports belong to specialised-supplier industry.

All these findings suggest that, first; the composition of imports may not exhibit as much differences as exports for different income groups. On the other hand, by economic development, we may expect a limited decrease in resource-intensive industry imports and increase in labour-intensive, specialised-supplier, and science-based industry imports.

Turkey's manufacturing industry imports composition is not much different than the other groups in the sample. Imports of scale-intensive industries constitute the larges share in total imports during whole period. This share is about 50 percent at the beginning of the 1980s, it shows a relatively decreasing pattern recently. What is interesting during the study period is that labour-intensive imports exhibited a small increase in this period. One last remark on the structure of Turkey's imports is that as being different than fast growing country group, specialised-supplier imports has followed a stable pattern during this period.

II. 5. Industrial Structure and Labour Productivity

In order to examine the impact of industrial structure and its change on aggregate productivity growth in manufacturing, we carry out two different methodologies: The first of these answers the question of "what level of labour productivity would be attained in manufacturing industry of a given country if its industrial structure was different?". The second is to decompose labour productivity growth by its sources to asses the contribution of structural change on productivity growth.

II. 5. 1. Relative labour productivity with different industrial structure

In order to find the productivity level of manufacturing industry of an economy with different industrial structure, we took a frontier economy with respect to labour productivity, and impose its industrial structure to the other countries. The frontier economy is taken to be the US in this analysis[9].

Let Q and L be total manufacturing value added and employment of country *i,* and *j* represent each manufacturing industry defined at three-digit ISIC level. Then, country *i*'s productivity, LP_i, defined as follows:

$$LP_i = \frac{Q_i}{L_i} = \frac{\sum_{j=1}^{j=28} Q_{i,j}}{\sum_{j=1}^{j=28} L_{i,j}} = \sum_{j=1}^{j=28} w_{i,j} * \frac{Q_{i,j}}{L_{i,j}} \qquad \text{(II.1)}$$

where;

$w_{i,j} = \frac{L_{i,j}}{L_i}$ is the share of industry j in total manufacturing employment.

Labour productivity of country *i* relative to US, RLP_i, on the other hand, can be defined as follows:

$$RLP_i = \frac{LP_i}{LP_{US}} = \frac{\sum_{j=1}^{j=28} w_{i,j} * \frac{Q_{i,j}}{L_{i,j}}}{\sum_{j=1}^{j=28} w_{US,j} * \frac{Q_{US,j}}{L_{US,j}}} \qquad \text{(II.2)}$$

[9] There is no specific purpose in taking the US as the frontier economy other than its high productivity in manufacturing industry. Indeed, the same analysis is carried out by taking Korea as the frontier economy. The results, however, did not change.

Relative productivity of country *i* with US industrial structure, $SSRLP^i$, then, can be written as follows:

$$SSRLP_i = \frac{\sum_{j=1}^{j=28} w_{US,j} * \frac{Q_{i,j}}{L_{i,j}}}{\sum_{j=1}^{j=28} w_{US,j} * \frac{Q_{US,j}}{L_{US,j}}} \qquad \text{(II.3)}$$

Calculation of expression in (II.3) will give us the answer to the question: "What would have been the relative productivity level of country *i* if its industrial structure was the same as that of the US?". If the difference between *RLP* and *SSRLP* is negative/positive, this shows that the representative country's labour productivity in manufacturing industry would be higher/lower if its manufacturing industry structure would be the same as that of the US.

Both relative labour productivity and relative labour productivity with the US industrial structure are depicted in Tables II. 4.a-b for each country from 1965 to 1999. Contrary to our expectations, we found no important productivity than 3 percent for the whole period). Few countries would have higher labour productivity if their manufacturing industry would be the same as that of US: Japan, Italy, Israel, Turkey, Korea, Costa Rica, Kenya, Indonesia, and so on.

Many countries, on the contrary, would have lower productivity level if their industrial structure was the same as that of the US than their productivity level with their own industrial structure. The most striking examples of these countries are Bolivia, Chile, Finland, Iceland, Ireland, Jordan, Mexico, Netherlands, and Venezuela. From the heterogeneity of these countries with respect to their income level, we understand that this outcome is not related to development level of these countries either.

Table II. 4. a. Labour productivity relative to US vs. relative productivity with US industrial structure.

	1965-99			1965-79		
Country	***RLP***	***SSRLP***	***Diff***	***RLP***	***SSRLP***	***Diff***
Japan	0.76	0.79	-0.03	0.51	0.52	-0.01
Canada	0.75	0.74	0.02	0.78	0.78	0.01
Germany	0.70	0.70	0.00	0.64	0.67	-0.03
Ireland	0.69	0.61	0.07	0.37	0.37	0.00
Sweden	0.69	0.68	0.01	0.69	0.69	0.00
Kuwait	0.64	0.30	0.34	0.74	0.31	0.43
Netherlands	0.62	0.56	0.06	0.54	0.52	0.02
France	0.59	0.59	0.00	0.52	0.54	-0.01
Norway	0.54	0.54	0.01	0.52	0.52	0.00
Finland	0.54	0.50	0.04	0.43	0.43	0.01
Chile	0.52	0.47	0.06	0.56	0.51	0.05
Venezuela	0.52	0.44	0.09	0.58	0.52	0.06
Italy	0.49	0.50	-0.01	0.41	0.42	-0.01
UK	0.48	0.48	0.00	0.38	0.38	0.00
Austria	0.48	0.47	0.00	0.39	0.39	0.00
Israel	0.39	0.41	-0.02	0.42	0.45	-0.03
Iceland	0.38	0.31	0.07	0.34	0.27	0.07
Spain	0.37	0.38	0.00	0.27	0.27	0.00
Singapore	0.37	0.36	0.01	0.23	0.23	0.00
Turkey	0.32	0.33	-0.01	0.31	0.34	-0.02
Mexico	0.32	0.25	0.07	0.29	0.20	0.09
Greece	0.32	0.31	0.01	0.30	0.31	-0.01
Korea	0.30	0.32	-0.01	0.14	0.15	-0.01
Panama	0.29	0.27	0.03	0.37	0.34	0.03
Colombia	0.26	0.23	0.03	0.26	0.23	0.03
Ecuador	0.22	0.19	0.03	0.24	0.21	0.03
Cyprus	0.22	0.21	0.01	0.20	0.19	0.01
Uruguay	0.22	0.20	0.02	0.16	0.15	0.01
Bolivia	0.21	0.13	0.08	0.11	0.10	0.02
South Africa	0.21	0.22	-0.01	0.23	0.25	-0.01
Jordan	0.20	0.16	0.05	0.20	0.17	0.02
Iran	0.20	0.22	-0.02	0.24	0.28	-0.04
Malta	0.19	0.19	0.01	0.15	0.14	0.01
Costa Rica	0.18	0.23	-0.05	0.26	0.25	0.01
Portugal	0.17	0.19	-0.02	0.16	0.17	-0.01
Zimbabwe	0.17	0.18	-0.01	0.20	0.22	-0.02
Tunisia	0.16	0.18	-0.02	0.16	0.16	0.00
Malaysia	0.15	0.16	-0.02	0.13	0.13	0.00
Morocco	0.15	0.15	-0.01	0.17	0.18	-0.01
Philippines	0.14	0.15	-0.01	0.16	0.17	-0.01
Hungary	0.14	0.15	-0.01	0.20	0.21	-0.02
Honduras	0.12	0.10	0.02	0.18	0.13	0.05
Pakistan	0.10	0.10	0.01	0.11	0.11	0.00
Ethiopia	0.10	0.08	0.02	0.12	0.08	0.04
Kenya	0.09	0.13	-0.03	0.13	0.20	-0.07
Egypt	0.08	0.09	-0.01	0.08	0.09	-0.01
Mauritius	0.07	0.08	-0.01	0.08	0.06	0.02
Tanzania	0.06	0.07	-0.01	0.09	0.11	-0.02
Sri Lanka	0.06	0.05	0.00	0.07	0.07	0.01
Indonesia	0.06	0.07	-0.02	0.04	0.04	-0.01
India	0.05	0.05	-0.01	0.05	0.06	-0.01
China	0.04	0.04	-0.01	0.00	0.00	0.00

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.

Note: RLP is the labour productivity relative to US.
SSRLP is the relative productivity level with US industrial structure.
Diff is the difference between RLP and SSRLP.

Table II. 4. b. Labour productivity relative to US vs. relative productivity with US industrial structure.

	1980-89			1990-99		
Country	***RLP***	***SSRLP***	***Diff***	***RLP***	***SSRLP***	***Diff***
Japan	0.85	0.88	-0.03	1.05	1.09	-0.04
Canada	0.77	0.75	0.02	0.70	0.67	0.03
Germany	0.77	0.75	0.02	0.72	0.69	0.03
Ireland	0.67	0.64	0.03	1.18	0.96	0.22
Sweden	0.72	0.70	0.01	0.65	0.63	0.02
Kuwait	0.70	0.39	0.30	0.42	0.17	0.25
Netherlands	0.62	0.55	0.08	0.73	0.63	0.09
France	0.59	0.59	0.00	0.68	0.66	0.02
Norway	0.55	0.53	0.02	0.58	0.57	0.01
Finland	0.59	0.57	0.02	0.66	0.54	0.12
Chile	0.55	0.45	0.10	0.45	0.42	0.03
Venezuela	0.61	0.49	0.12	0.33	0.23	0.10
Italy	0.54	0.55	-0.01	0.56	0.58	-0.02
UK	0.55	0.54	0.00	0.57	0.56	0.01
Austria	0.48	0.48	0.00	0.61	0.59	0.01
Israel	0.46	0.48	-0.02	0.28	0.28	0.00
Iceland	0.36	0.32	0.05	0.50	0.38	0.12
Spain	0.43	0.43	0.00	0.47	0.48	-0.01
Singapore	0.36	0.38	-0.02	0.59	0.54	0.05
Turkey	0.28	0.27	0.02	0.37	0.39	-0.02
Mexico	0.35	0.29	0.06	0.33	0.29	0.04
Greece	0.30	0.29	0.01	0.35	0.33	0.03
Korea	0.26	0.29	-0.03	0.59	0.59	0.00
Panama	0.31	0.30	0.01	0.16	0.11	0.05
Colombia	0.28	0.25	0.03	0.23	0.21	0.03
Ecuador	0.21	0.20	0.01	0.20	0.13	0.07
Cyprus	0.21	0.21	0.01	0.25	0.24	0.01
Uruguay	0.25	0.23	0.02	0.27	0.24	0.03
Bolivia	0.36	0.20	0.15	0.22	0.11	0.11
South Africa	0.22	0.23	-0.01	0.18	0.18	-0.01
Jordan	0.31	0.20	0.11	0.11	0.09	0.02
Iran	0.26	0.26	0.00	0.07	0.07	0.00
Malta	0.22	0.22	0.00	0.25	0.23	0.01
Costa Rica	0.13	0.31	-0.18	0.11	0.13	-0.02
Portugal	0.16	0.17	-0.01	0.19	0.24	-0.04
Zimbabwe	0.18	0.19	-0.01	0.10	0.10	0.00
Tunisia	0.17	0.20	-0.02	0.15	0.18	-0.03
Malaysia	0.17	0.19	-0.02	0.16	0.20	-0.03
Morocco	0.15	0.15	0.01	0.11	0.12	-0.02
Philippines	0.10	0.11	-0.01	0.14	0.15	-0.01
Hungary	0.09	0.10	-0.01	0.09	0.09	0.00
Honduras	0.11	0.11	0.00	0.03	0.03	-0.01
Pakistan	0.12	0.11	0.02	0.07	0.07	0.00
Ethiopia	0.12	0.10	0.02	0.05	0.05	0.01
Kenya	0.09	0.09	-0.01	0.05	0.05	-0.01
Egypt	0.10	0.11	-0.01	0.06	0.06	0.00
Mauritius	0.06	0.08	-0.02	0.07	0.10	-0.03
Tanzania	0.05	0.06	-0.01	0.01	0.02	-0.01
Sri Lanka	0.05	0.04	0.01	0.04	0.04	-0.01
Indonesia	0.07	0.09	-0.02	0.07	0.09	-0.03
India	0.04	0.05	-0.01	0.04	0.04	0.00
China	0.05	0.07	-0.02	0.03	0.03	0.00

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.

Note: RLP is the labour productivity relative to US.
SSRLP is the relative productivity level with US industrial structure.
Diff is the difference between RLP and SSRLP.

II. 5. 2. The Impact of Structural Change on Productivity Growth

This section of the chapter examines the contribution of structural change to the growth of labour productivity by making use of decomposition analysis, or often called shift-share analysis. This analysis allows one to decompose the change or growth of productivity by its sources. The first is the one resulting from productivity growth within industries, called the within-effect, and the second being the effect resulting from the reallocation of labour between industries, called the between-effect.

Note that there are many ways of measuring structural change (see Syrquin 1988 for a detailed discussion): Measuring structural change as the change in the industrial shares of output or employment in total manufacturing is one method of measurement. It is also possible to measure structural change on the basis of the industries' technology orientations or intensity. While we measure structural change as the change in employment in the industries of manufacturing sector in this section, we will be measuring it with respect to industries technology intensity in the coming chapter.

Let $Q_{i,t}$ and $L_{i,t}$ be total manufacturing value added and employment of a given country, subscript i and t denotes country and time. Then, labour productivity in manufacturing industry of country i at time t, $LP_{i,t}$, may be defined as follows:

$$LP_{i,t} = \frac{Q_{i,t}}{L_{i,t}} = \frac{\sum_{j=1}^{j=28} Q_{i,t,j}}{\sum_{j=1}^{j=28} L_{i,t,j}} = \sum_{j=1}^{j=28} w_{i,t,j} * \frac{Q_{i,t,j}}{L_{i,t,j}} \qquad \text{(II.4)}$$

where;

$w_{i,t,j} = \frac{L^{i}_{i,t,j}}{L_{i,t}}$ is the share of industry j in total manufacturing employment of country i at time t.

The change in the level of labour productivity may then be represented as:

$$LP_{i,t} - LP_{i,t-1} = \sum_{j=1}^{j=28} (LP_{i,t,j} - LP_{i,t-1,j}) * \overline{w}_{i,j} + \sum_{j=1}^{j=28} (w_{i,t,j} - w_{i,t-1,j}) * \overline{LP}_{i,j} \quad \text{(II.5)}$$

where;

$\overline{w}_{i,j}$ and $\overline{LP}_{i,j}$ are the two-year averages of the share and labour productivity of industry *j* of country *i*.

Equation (II.5) may be modified to reflect growth rates by dividing the whole equation by labour productivity as follows:

$$\frac{LP_{i,t} - LP_{i,t-1}}{LP_{i,t-1}} = \frac{\sum_{j=1}^{j=28} (LP_{i,t,j} - LP_{i,t-1,j}) * \overline{w}_{i,j}}{LP_{i,t-1}} + \frac{\sum_{j=1}^{j=28} (w_{i,t,j} - w_{i,t-1,j}) * \overline{LP}_{i,j}}{LP_{i,t-1}} \quad \text{(II.6)}$$

Equation (II.6) implies that aggregate productivity growth can be decomposed into two parts. The first term on the right hand side of the equation is the within-effect, and gives the contribution of within-industry productivity growth. The second term is the between-effect, and measures the magnitude of productivity growth resulting from the movement of labour from low-productivity industries to high-productivity industries, i.e., structural change. We expect this term to be positive if there be a contribution of structural change on productivity growth. Differently from Fagerberg (2000), Thimmer and Szirmai (2000) and Peneder (2003), we calculate productivity growth and its components for each year rather than between two distinct points in time to see whether countries exhibit changing patterns in different time periods as regard to the sources of labour productivity growths.

The results on productivity growth and its sources for our sample of countries for the period of 1965 to 1999 are presented in Table II. 5. The findings show that for most of the countries in the sample structural change did not contribute to labour productivity growth. In other words, labour productivity growth in manufacturing industries may totally be explained by productivity growth within individual industries for the whole period. We found positive impact of structural change on productivity growth for only a few countries i.e.; Jordan, Indonesia, Malta, Iran, and Singapore. In all other economies, structural change helped neither increase nor decrease in manufacturing labour productivity growth during this period.

Especially in industrialised countries, negligible impact of structural change on labour productivity growth is interesting (see, for example, US, UK, Japan, Canada, Spain, and France). The results for fast growing countries are mixed: While in Korea, for example, the whole productivity growth in manufacturing comes from *the within* growth, 27 and 16 percent of labour productivity growth resulted from structural change in the pre-1980 period and the 1990s respectively in Ireland. Note that in these two countries both manufacturing production and productivity grew fast remarkably.

Negligible impact of structural change on productivity growth may be due to following reasons: first, high rates of domestic capital accumulation, technological advancement, human capital, and etc. may at least be as important as improving the allocation of resources among sectors for rapid industrial upgrading and high growth rates[10]. Second, some specific kinds of structural changes at more disaggregated levels such as structural change in organisations, or movements of resources across firms in a particular industry may be reflected in within industry labour productivity growth (OECD, 2002: 5). Disney *et all*. (2003), for instance, found that external restructuring, exit of low productivity establishments and entry of high productivity firms, accounts for 50

[10] See, for instance, Akyuz and Gore (1996) and Akyuz (1999), for the affects of savings, investments, institutions, and governments on rapid growth and industrial development.

Table II. 5. a. Decomposition of labour productivity, average growth rates, constant US dollars.

	1965-99			1965-79		
Country	***LP growth***	***Within***	***Between***	***LP growth***	***Within***	***Between***
Korea	0.083	0.082	0.001	0.086	0.086	0.001
Ireland	0.075	0.064	0.009	0.041	0.030	0.011
Hungary	0.066	0.061	0.005	0.041	0.038	0.003
Malta	0.062	0.049	0.014	0.057	0.042	0.016
Philippines	0.058	0.054	0.003	-0.002	0.006	-0.008
Netherlands	0.045	0.042	0.003	0.053	0.048	0.005
US	0.041	0.041	0.000	0.025	0.025	0.000
Japan	0.038	0.039	0.000	0.063	0.064	-0.001
Finland	0.038	0.036	0.002	0.034	0.032	0.002
Kuwait	0.038	0.042	-0.005	-0.042	-0.021	-0.022
Austria	0.037	0.037	0.000	0.032	0.033	-0.002
Jordan	0.036	0.005	0.031	0.152	0.077	0.075
Turkey	0.034	0.030	0.004	0.012	-0.006	0.018
Uruguay	0.034	0.035	-0.001	-0.025	-0.010	-0.015
Greece	0.031	0.027	0.004	0.042	0.037	0.005
UK	0.030	0.028	0.003	0.022	0.020	0.002
Israel	0.027	0.023	0.004	0.052	0.045	0.007
Sweden	0.027	0.026	0.001	0.029	0.029	0.001
Spain	0.026	0.025	0.001	0.053	0.047	0.005
Canada	0.026	0.026	0.000	0.022	0.022	0.001
Iran	0.026	0.015	0.011	0.041	0.026	0.016
France	0.026	0.024	0.002	0.034	0.031	0.002
Ecuador	0.026	0.019	0.006	0.036	0.030	0.007
Honduras	0.025	0.019	0.007	-0.015	-0.055	0.041
Colombia	0.023	0.023	0.000	0.025	0.020	0.005
Indonesia	0.022	0.002	0.019	0.061	0.008	0.053
Egypt	0.020	0.016	0.004	0.017	0.014	0.003
India	0.018	0.015	0.003	-0.025	-0.027	0.002
Zimbabwe	0.017	0.015	0.002	0.005	0.002	0.003
Chile	0.014	0.006	0.008	0.019	0.003	0.016
Malaysia	0.014	0.010	0.004	-0.018	-0.027	0.009
Cyprus	0.013	0.010	0.004	0.004	-0.001	0.005
Singapore	0.013	0.003	0.010	-0.019	-0.026	0.006
Germany	0.013	0.011	0.001	0.025	0.024	0.001
Mexico	0.012	0.014	-0.003	0.031	0.025	0.006
Norway	0.011	0.010	0.001	0.009	0.003	0.006
South Africa	0.010	0.006	0.003	0.004	0.002	0.003
Ethiopia	0.009	0.001	0.007	0.005	-0.006	0.010
Portugal	0.002	0.003	0.001	-0.003	-0.007	0.004
Italy	-0.001	0.000	-0.001	0.014	0.013	0.001
Costa Rica	-0.001	-0.002	0.000	-0.003	-0.006	0.002
Kenya	-0.005	-0.009	0.004	-0.006	-0.010	0.004
Sri Lanka	-0.008	-0.017	0.009	-0.024	-0.042	0.016
Tunisia	-0.008	-0.002	-0.007	-0.015	-0.007	-0.010
Pakistan	-0.012	-0.015	0.003	-0.025	-0.029	0.004
Tanzania	-0.034	-0.043	0.009	-0.025	-0.030	0.005

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.

Notes: Sum of within and between effects may not add to labour productivity growth due to rounding. The data were available from 1973 to 1997 for South Africa and Cyprus;1971 to 1994 for Finland; 1971 to 1995 for France, Israel, and UK; 1971 to 1996 for Philippines.

Table II. 5. b. Decomposition of labour productivity, average growth rates, constant US dollars.

	1980-89			1990-99		
Country	***LP growth***	***Within***	***Between***	***LP growth***	***Within***	***Between***
Korea	0.060	0.059	0.000	0.101	0.098	0.004
Ireland	0.089	0.085	0.005	0.107	0.090	0.017
Hungary	0.025	0.023	0.002	0.141	0.132	0.009
Malta	0.022	0.027	-0.005	0.130	0.094	0.036
Philippines	0.074	0.060	0.013	0.154	0.142	0.013
Netherlands	0.048	0.042	0.006	0.037	0.039	-0.002
US	0.039	0.037	0.003	0.066	0.069	-0.003
Japan	0.034	0.035	-0.001	0.008	0.007	0.001
Finland	0.046	0.042	0.004	0.035	0.034	0.001
Kuwait	0.073	0.000	0.073	0.104	0.172	-0.068
Austria	0.035	0.032	0.002	0.047	0.046	0.001
Jordan	-0.032	-0.043	0.010	-0.101	-0.071	-0.030
Turkey	0.054	0.058	-0.004	0.044	0.053	-0.009
Uruguay	0.052	0.042	0.010	0.079	0.077	0.002
Greece	0.010	0.009	0.001	0.035	0.030	0.006
UK	0.062	0.059	0.002	0.010	0.006	0.004
Israel	0.008	0.006	0.002	0.002	0.006	-0.004
Sweden	0.034	0.032	0.001	0.017	0.016	0.001
Spain	0.032	0.029	0.003	-0.017	-0.011	-0.006
Canada	0.021	0.023	-0.002	0.037	0.036	0.002
Iran	0.003	-0.010	0.012	0.030	0.049	-0.019
France	0.015	0.015	0.000	0.024	0.023	0.001
Ecuador	-0.026	-0.035	0.008	0.062	0.058	0.004
Honduras	0.064	0.081	0.017	0.057	0.100	-0.043
Colombia	0.017	0.017	0.000	0.026	0.032	-0.005
Indonesia	-0.009	-0.019	0.010	0.016	0.018	-0.003
Egypt	0.023	0.017	0.007	0.020	0.019	0.002
India	0.042	0.038	0.004	0.055	0.050	0.004
Zimbabwe	0.026	0.024	0.002	0.021	0.015	0.006
Chile	-0.013	-0.009	-0.004	0.035	0.027	0.008
Malaysia	0.027	0.029	-0.002	0.037	0.032	0.004
Cyprus	0.010	0.010	-0.001	0.030	0.024	0.006
Singapore	0.026	0.007	0.019	0.044	0.039	0.006
Germany	0.026	0.024	0.001	-0.017	-0.020	0.002
Mexico	-0.002	-0.003	0.000	0.011	0.020	-0.010
Norway	0.020	0.018	0.002	0.007	0.014	-0.007
South Africa	-0.004	-0.006	0.002	0.031	0.024	0.006
Ethiopia	0.011	0.009	0.001	0.023	0.011	0.009
Portugal	0.031	0.032	0.000	-0.022	-0.014	-0.009
Italy	0.013	0.011	0.002	-0.033	-0.026	-0.007
Costa Rica	-0.038	-0.031	-0.007	0.038	0.034	0.004
Kenya	-0.041	-0.042	0.001	0.040	0.033	0.007
Sri Lanka	0.012	-0.003	0.015	-0.006	0.003	-0.009
Tunisia	-0.003	0.006	-0.009	-0.003	-0.002	-0.002
Pakistan	0.017	0.022	-0.005	-0.027	-0.040	0.013
Tanzania	-0.084	-0.089	0.005	0.008	-0.012	0.021

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.

Not: Sum of within and between effects may not add to labour productivity growth due to rounding. The data were available from 1973 to 1997 for South Africa and Cyprus;1971 to 1994 for Finland; 1971 to 1995 for France, Israel, and UK; 1971 to 1996 for Philippines.

percent of labour productivity growth in UK manufacturing from 1980 to 1992. Third, decomposition analysis does not capture the spillover effects[11,12] and externalities.

II. 6. Summary

This chapter provides evidence on the relationship between industrial structure and performance and the development stage of economies. We observed that specialised supplier and science based industries recorded the highest growth rates in production, productivity and trade from 1965 to 1999. Accordingly, the growth performance of manufacturing industry of fast growing countries has been outstanding in these industries.

The results also imply that industrial structure of manufacturing with respect to both production and trade matters also for performance: We found that in the path of industrialisation, the structure of manufacturing industry shows radical changes i.e., decreasing share of labour and resource intensive industries in total manufacturing production and trade on the one hand, and increasing share of specialised supplier industries on the other.

Decomposition analysis results showed positive effect of structural change on productivity growth in a very limited number of countries, i.e. Indonesia, Iran, Ireland, Jordan, Malta, and Singapore from 1965 to 1999. Especially in industrialised countries, almost no impact of structural change productivity growth in manufacturing is found

This finding leads to the conclusion that structural change seems to have a negligible impact on overall growth in labour productivity because industrially

[11] Increase in productivity of an industry may affect the productivity performance of the other industries of manufacturing.

[12] See Fagerberg (2000) for the spillover effects of the expansion of electrical machinery industry on aggregate labour productivity growth.

successful countries achieve higher productivity growth across all industries, i.e., the *within-effect* dominates the *between-effect*.

CHAPTER III

TECHNOLOGY, INDUSTRIAL STRUCTURE AND ECONOMIC PERFORMANCE

In so far as the industrialisation remains an engine of development, structural change and technological growth and modernization, growing manufactured exports are a sign that this engine is working (Lall, 2000: 338).

III.1. Introduction

For a long time in the past century, manufacturing industry was seen as the engine of economic growth (Thirlwall, 1999 and 2002). What matters for growth and competitiveness, now however, is more of the structure of manufacturing industry, especially technological structure (Fagerbarg, 2002). Technological structure of manufacturing production and trade, therefore, plays an important role in industrial development.

This chapter, therefore, examines the evolution of manufacturing industry structures of different countries since the structure of production and trade, especially exports, of a given country reflects its endowments (natural resources, capital, labour, and technology), capability, and specialisation (OECD, 1996;

Krugman, 1995; Lall, 2000; Montobbio and Rampa, 2005). In doing so, the following questions will be answered: First, "do the industrial structures of economies show any similarities or are they persistently different?". Second, "is there a convergence or divergence among the industrial structures of these economies?". More importantly, third, "may there be a relationship between structural convergence and industrial development?".

The relationship between the evolution of industrial structure and industrial development is called structural convergence. Abegaz (2002) summarizes the significance of the issue of convergence/divergence in inter-industry output structure for the economics of growth, trade and industrial organisation as follows:

> *First, its existence suggests that the dominant forces that drive industrialisation consist of growing similarities in technology, preferences and income levels rather than differences in factor endowments, institutions, history, or geography. The existence of significant differences in the speed of convergence throws some light on the ongoing debate with regard to the efficacy of broad-based versus well-targeted industrial policies that are designed to promote productivity driven growth. (Abegaz, 2002: 71)*

Studies on convergence have usually relied on level variables i.e, per-capita income, productivity, and so on. Convergence in industrial structure of countries, on the other hand, has received little attention especially at low levels of disaggregating. Abegaz (2002), among few, reported that although there exists a measurable but weak structural convergence between developed and less developed countries, newly industrial economies have made significant inroads in converging to developed countries with respect to industrial structure. In the last part of chapter, therefore, we look for the answer to the question, that is, whether the industrial structure differs for developed and less developed economies or not; if so, how these structures evolve through time. In other words, whether industrial structures converge or diverge among countries. We agree with Abegaz (2002) that a two-way relationship between industrial structure and industrial growth should exist. Differential industrial growth rates

in manufacturing modify industrial structure, and inherited structures, in turn, shape subsequent industrial growth of economies (Abegaz, 2002: 71).

This chapter of the thesis is organised as follows: The next section examines the evolution of manufacturing industry composition with respect to their technology intensity for manufacturing value added, exports, and imports. Section three investigates the existence of convergence/divergence in the structures of manufacturing industries with respect to both production and trade in the countries in the sample. Section four summarizes the findings of this chapter.

III.2. Technology and structural dynamics

This section evaluates the structure of manufacturing industry production and trade with respect to their technology intensity (see Appendix A for the technological characteristics of industries). In technological classification of industries, each industry is determined as Low, Medium, or High technology intensive industry on the basis of its R&D intensity, which is measured as the ratio of business-enterprise R&D to production in the OECD area as a whole (OECD, 1992). Using technology intensity rather than technology orientations allows a three-dimensional presentation of the technological structures of manufacturing industries of different countries. Interpretations will not differ since these two measures of technology are reflections of each other. Moreover, classification of industries with respect to technology orientations, indeed, is based on the intensities of R&D in manufacturing industry (Türel, 2003: 26).

III.2.1. Structure of manufacturing value added

The evolution of industrial structure according to technology intensity for different country groups is presented in Figure III. 1.a-f. Each data point for a

country represents 5-year average share of industry value added by technology intensity for 7 periods; 1965-69, 1970-74, 1975-79, 1980-84, 1985-89, 1990-94, and 1995-99. Note, also, that the point where the country name is written represents the final sub-period, 1995-99. For a given country and a time period, a point in the middle of the triangle reflects that total manufacturing value added of this country is equally distributed among three different technology intensive industries.

Our findings show that most of manufacturing value added is produced by the low-technology industries in most low-income countries (see Figure III. 1. a). The share of medium and high technology industries in total manufacturing is relatively higher only in the manufacturing industries of India and Pakistan among the low income countries. Moreover, industrial structure of Indian manufacturing is quite similar to that of high income countries. Interestingly however, Indian manufacturing industry is more oriented towards medium technology intensive industries rather than that of high.

In the middle income country groups, industrial structures and their evolution are mixed (Figure III. 1. b-c). While the share of low technology intensive industries in total manufacturing is quite high in some countries i.e.; Sri Lanka, Ecuador, Morocco, Colombia, Mauritius, Uruguay and so on, the share of medium and high technology intensive industry value added in some other low income countries (China, Iran, Mexico, South Africa, Hungary) is not negligible. One other important finding on industrial structures of middle income countries is that there is no consistent tendency through more technology intensive production with the exception of Iran and China.

Industrial structures of non-continental European countries with high income have more heterogeneous distribution as compared to high income continental European countries (see Figure III. 1. d and e.). High income non-continental European countries, thereby, may be classified into two distinct groups: The first group is the small, non-industrialized but rich economies such as Kuwait,

Cyprus. The members of other group, on the other hand, are mostly large, industrialized countries like the US and Japan. While manufacturing value added of the first group is based mainly on low-technology, the second group of countries has not only a dynamic structure but also a structure allowing for almost equal distribution of manufacturing value added among three different technology intensive industries (see Figure III. 1. d).

From 1965 to 1999, in contrast to the other European countries, the industrial structures of Portugal and Greece composed mainly of low technology industries. Moreover, these countries have not reflected a changing industrial structure in this period. In this country group, Germany, Sweden, France, Finland, and Austria have not only more technology intensive manufacturing industry but also a dynamic industrial structure oriented through both medium and high technology.

When the structures of fast growing countries are examined, the findings are striking (see Figure III. 1. f.) Among the fast growing countries, we found that the manufacturing industries of Indonesia, Turkey, and Philippines are mainly composed of low technology industries. Furthermore, during the period under study, the manufacturing industry structures of these economies have not changed much as compared with the other members of this group. On the other hand, industry structures of Korea, Malaysia, Singapore, Ireland, and Malta have shown radical changes from 1965 to 1999. We see that, of these countries, while the lion's share of manufacturing value added is produced low technology intensive industries, production shifts through medium and high technology industries at the end of the period.

As a fast growing country with respect to manufacturing production, the evolution of Turkish manufacturing industry shows disappointing pattern. With its current industrial structure, Turkish manufacturing industry is more similar to that of the low income countries. One interesting finding is the movement of manufacturing production through low technology intensive industries at the

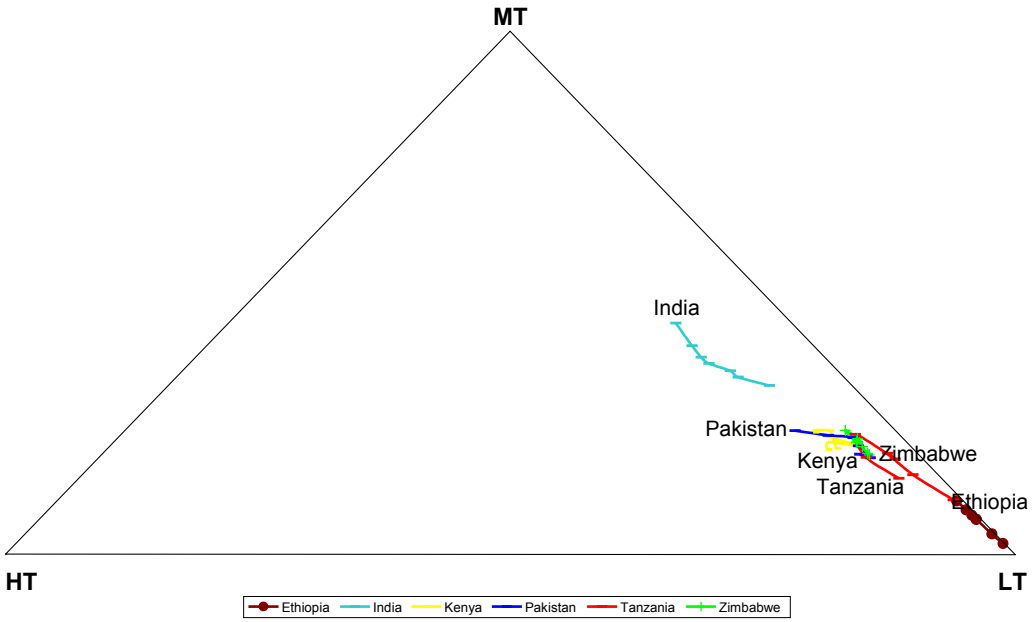


Figure III. 1. a. Production structure, low income countries, 1965-99.

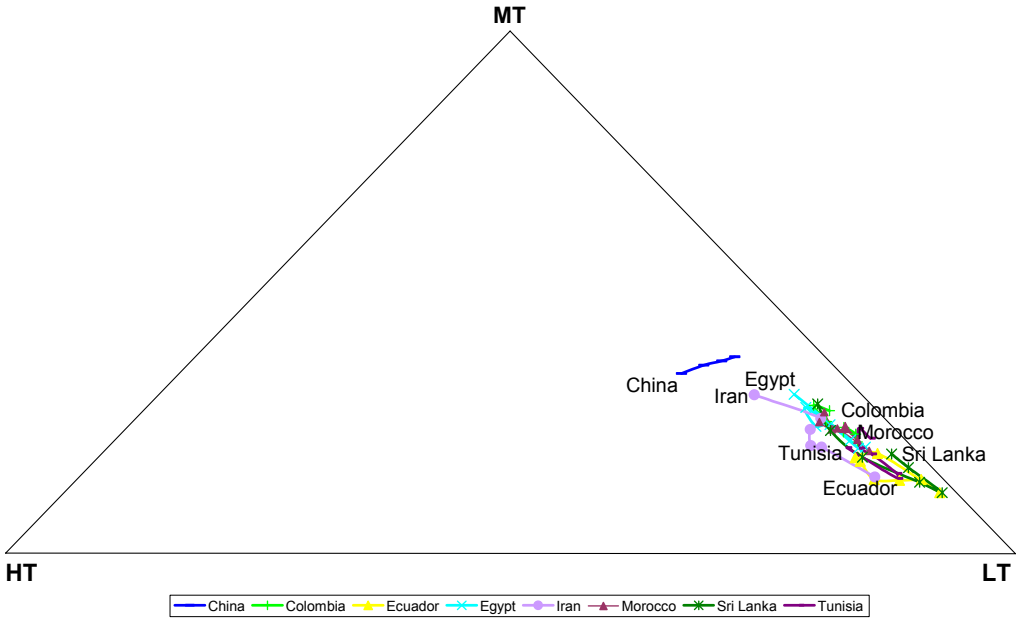


Figure III. 1. b. Production structure, selected middle income countries, 1965-99.

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

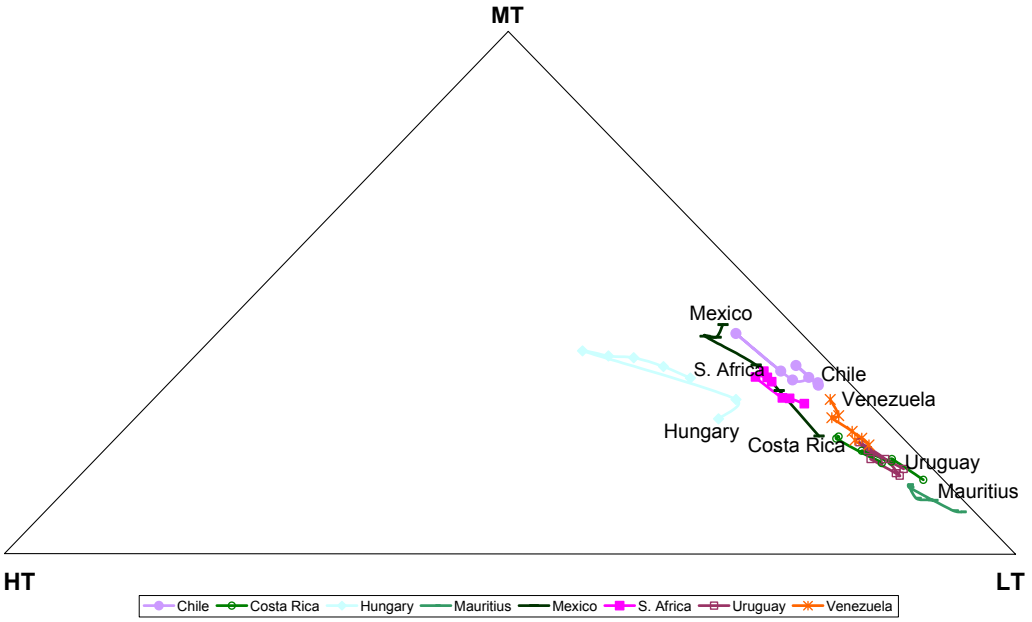


Figure III. 1.c. Production structure, selected middle income countries, 1965-99.

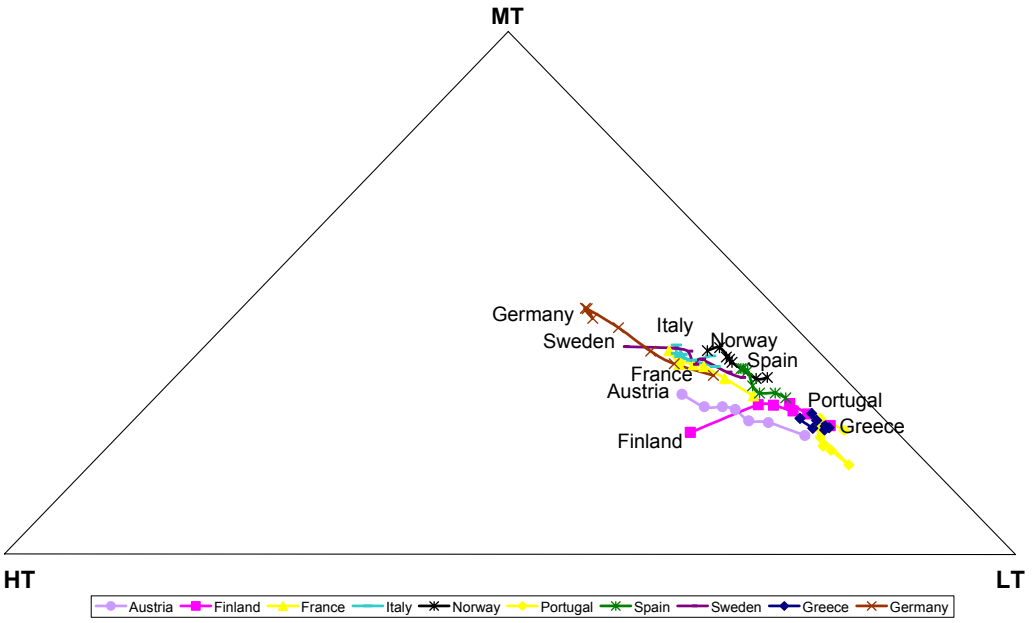


Figure III. 1.d. Production structure, selected high income countries, 1965-99.
Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

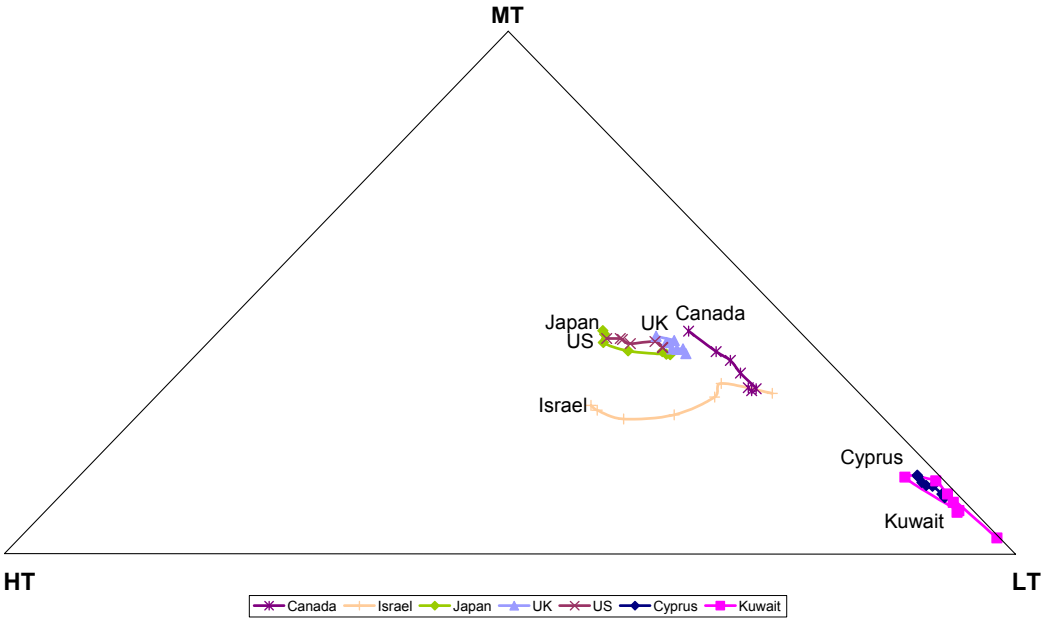


Figure III. 1. e. Production structure, selected high income countries, 1965-99.

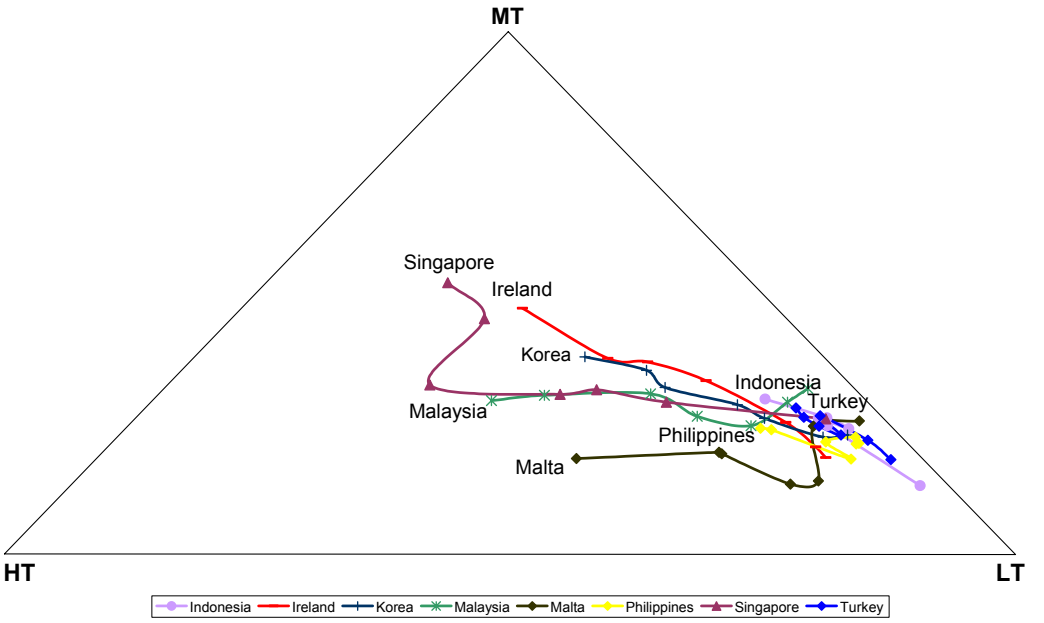


Figure III. 1. f. Production structure, fast growing countries, 1965-99.
Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

beginning of 1980s which is the period of the adoption of policies directed trough trade liberalisation and export-led growth.

The findings on the evolution of industrial structure of economies, in sum, suggest that the level of development is not independent of industrial structure. With few exceptions, well performing countries showed a dynamic industrial structure by increasing the share of medium and high technology industries relative to that of low from 1965 to 1999 (see Korea, Ireland, Singapore, Malaysia, and Malta in Figure III. 1.f) Those who were not able to change their industrial structure in favour of high and medium technology turned out to be the ones who were unsuccessful in triggering industrial development process i.e.; low income countries other than the fast growing.

III.2.2. Structure of manufacturing exports and imports

The distribution of manufacturing exports and imports and their evolution from 1981 to 1999 are presented in Figure III. 2.a-l. The interpretations of the data presented in the figures are the same as in previous section. The first observation is that while exports structure of manufacturing industry shows quite meaningful differences among different income groups, imports structure of these different country groups are very similar expect for fast growing country groups. We found that for all income groups, imports are distributed almost equally among three different technology intensive industries. However, there are some outliers in some of the country groups: Mauritius among upper middle income countries, and Sri Lanka, Tunisia, Egypt, and Morocco in the middle income country group are those countries showing dissimilarities as compared with their country group. These countries' manufacturing industry imports composed of more of low and medium technology intensive products relative to their country groups.

For exports, the picture is much more complicated: Low income countries are very similar with those of lower-middle income countries that most of their

manufacturing exports are made by low technology intensive industries (about 80-90 percent) (see Figure III. 2.a and c.). Only India and Morocco have a slightly better position with respect to exports structure of these two groups. What is more interesting result is that especially in lower-middle income countries export structure of manufacturing industry evolved through low technology intensive industries i.e.; Morocco, Tunisia, Egypt, and Sri Lanka.

With respect to technological structure of exports, upper middle income countries are more heterogeneously distributed. In this country group, while Venezuela, Costa Rica, Uruguay, and Mauritius have a manufacturing industry exporting mostly low technology products, the share of medium technology intensive exports in total manufacturing industry exports of Chile and South Africa is quite high. Among the lower middle income countries, Mexico is the only country who has a manufacturing industry in which the shares of medium and high technology intensive products are quite larger. Moreover, Mexican manufacturing industry exports shows a radical evolution through high technology intensive exports (see Figure III. 2. e).

Among the high income countries, we observed the structure of manufacturing exports of European countries to be more dynamic than the other high income countries (see Figure III. 2. g and i). We found that the shares of medium and high technology intensive exports are quite larger in total manufacturing in European countries except for Portugal and Greece. In these two countries, the share of low technology intensive exports in manufacturing is very high (about 80 percent), in spite of the fact that the share of medium and high technology intensive exports of the manufacturing industry of these two countries have moved through medium and high technology intensive products especially in the last period. One last observation on the structure of trade is the fact that continental European countries have very similar the import structures with respect to technology intensity (see Figure III. 2. h).

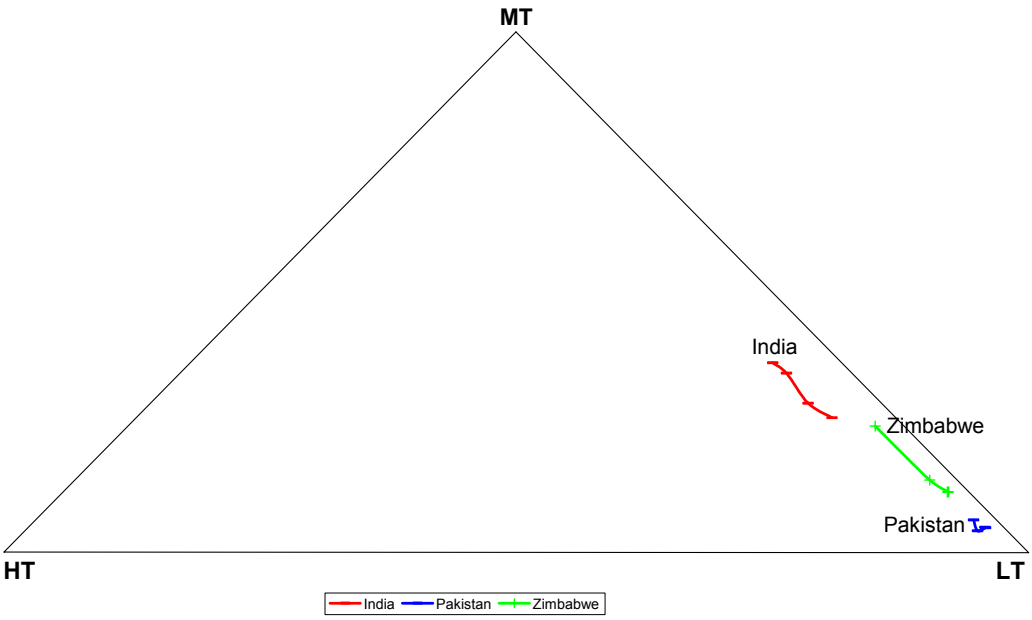


Figure III. 2. a. Export structure, low income countries, 1981-99.

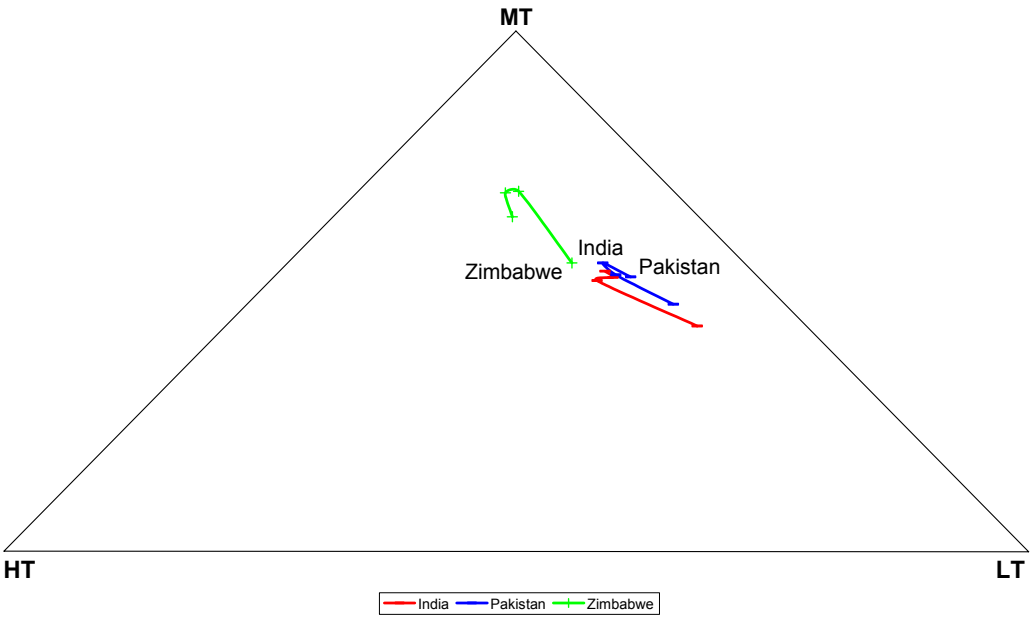


Figure III. 2. b. Import structure, low income countries, 1981-99.
Source: Industrial Demand Supply Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

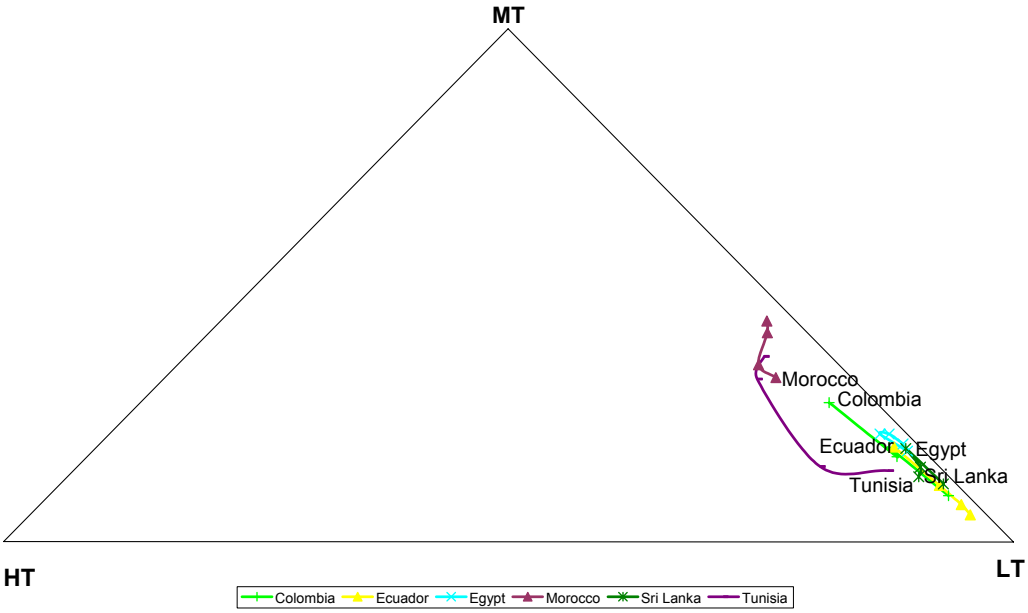


Figure III. 2. c. Export structure, selected middle income countries, 1981-99.

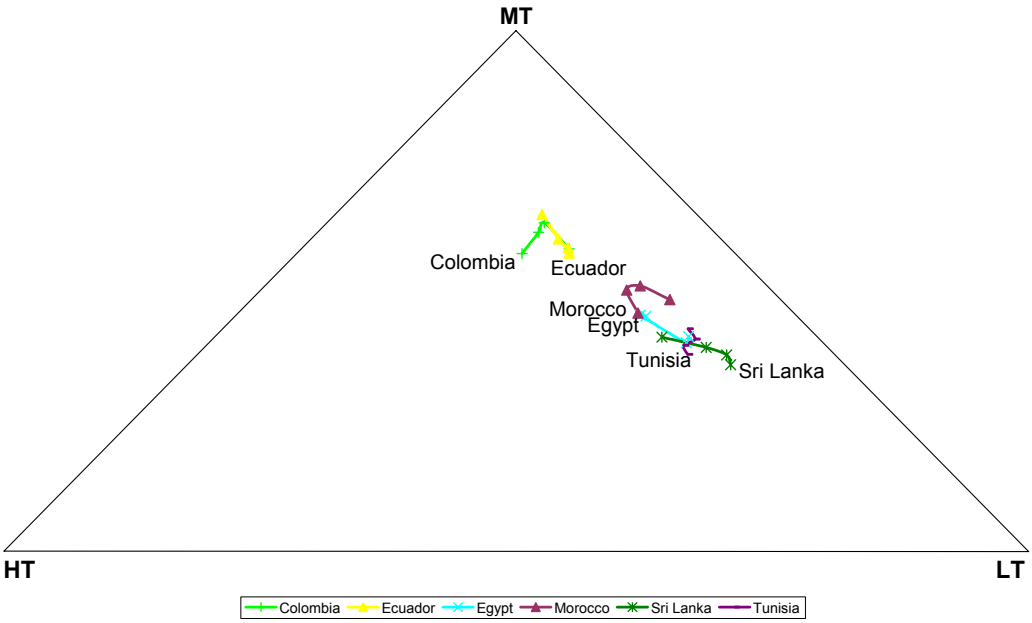


Figure III. 2. d. Import structure, selected middle income countries, 1981-99.
Source: Industrial Demand Supply Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

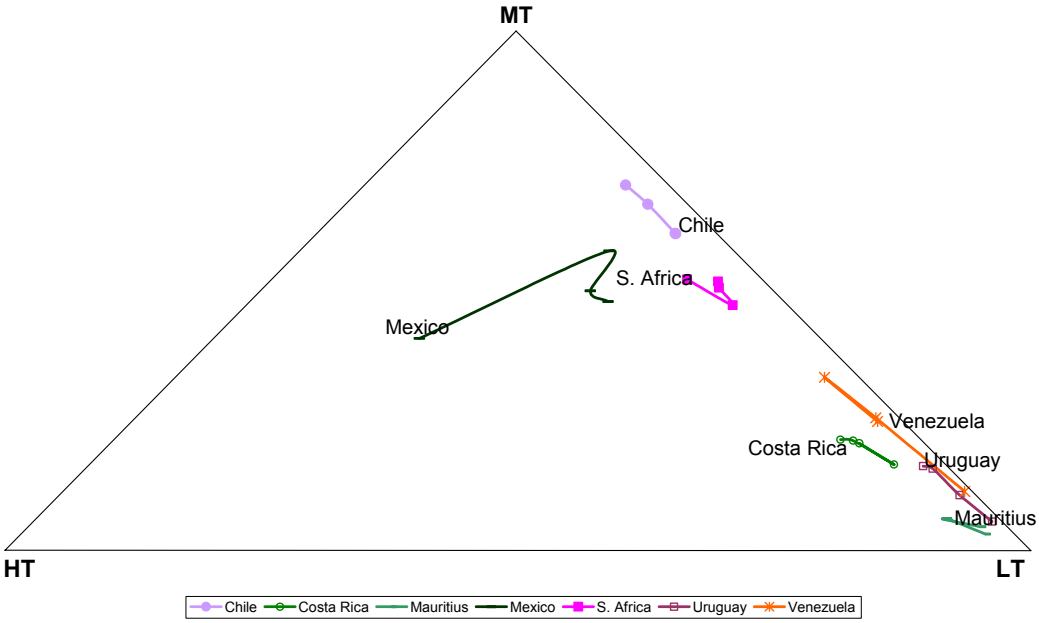


Figure III. 2. e. Export structure, selected middle income countries, 1981-99.

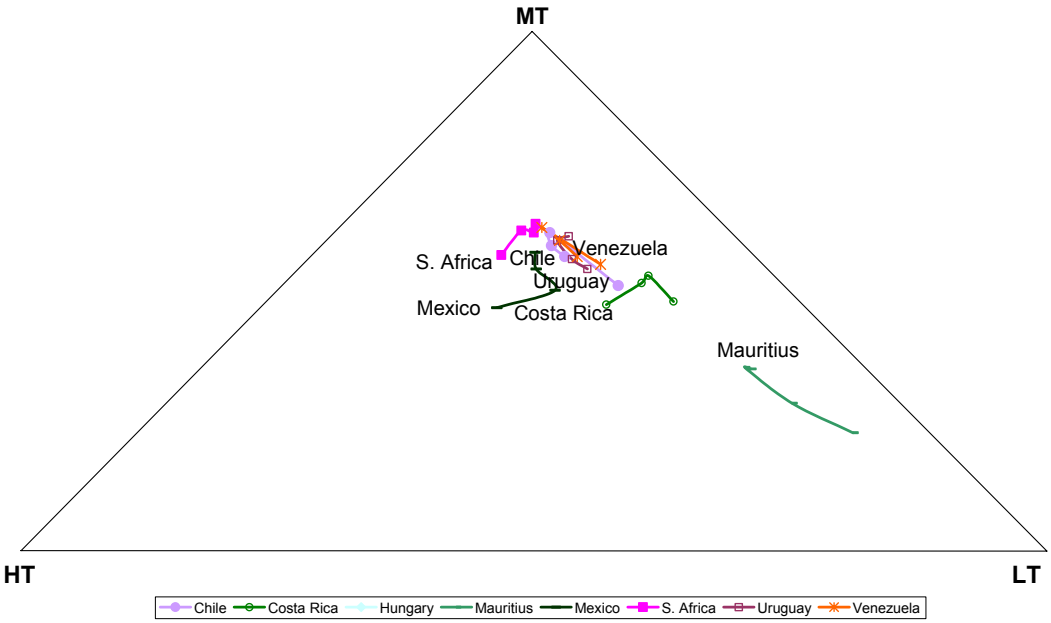


Figure III. 2. f. Import structure, selected middle income countries, 1981-99.
Source: Industrial Demand Supply Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

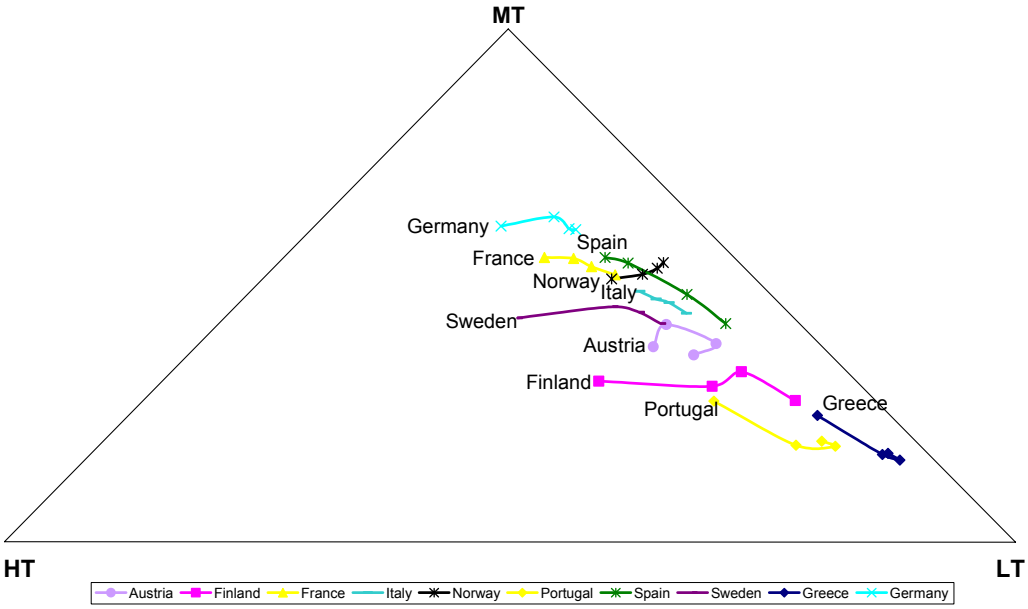


Figure III. 2. g. Export structure, selected high income countries, 1981-99.

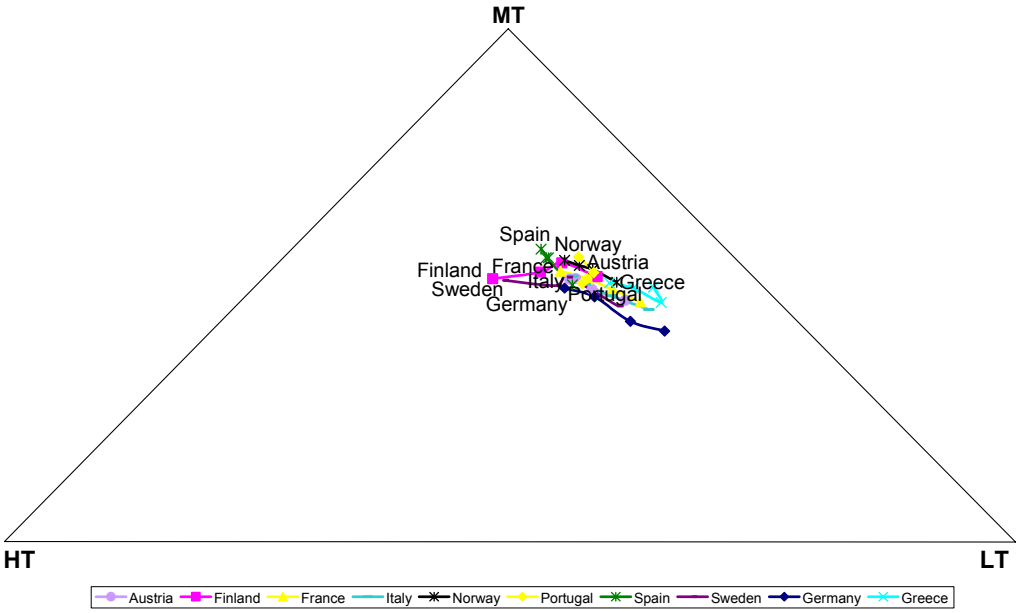


Figure III. 1. h. Import structure, selected high income countries, 1981-99.
Source: Industrial Demand Supply Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

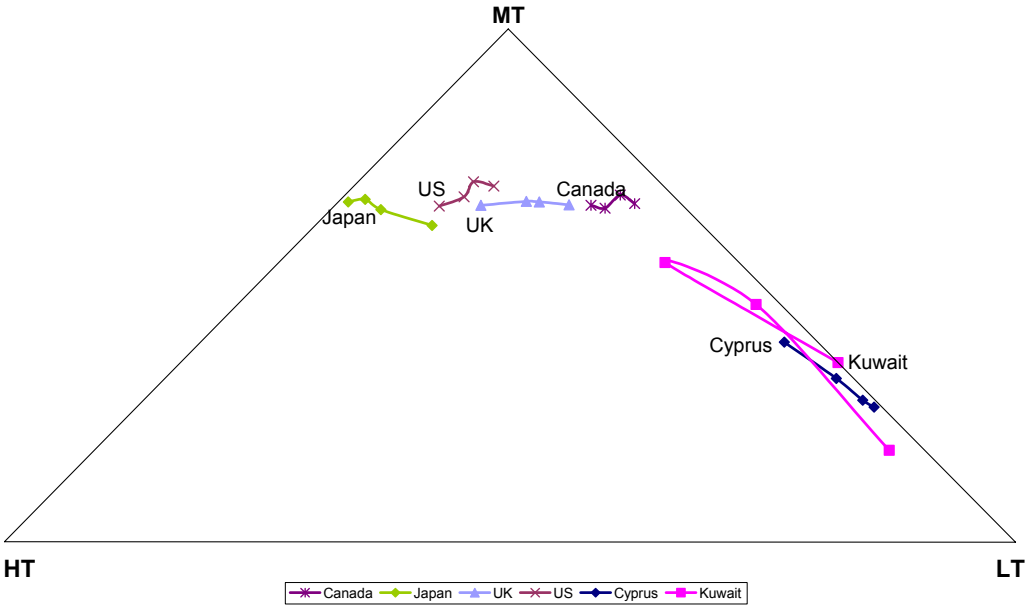


Figure III. 2. i. Export structure, selected high income countries, 1981-99.

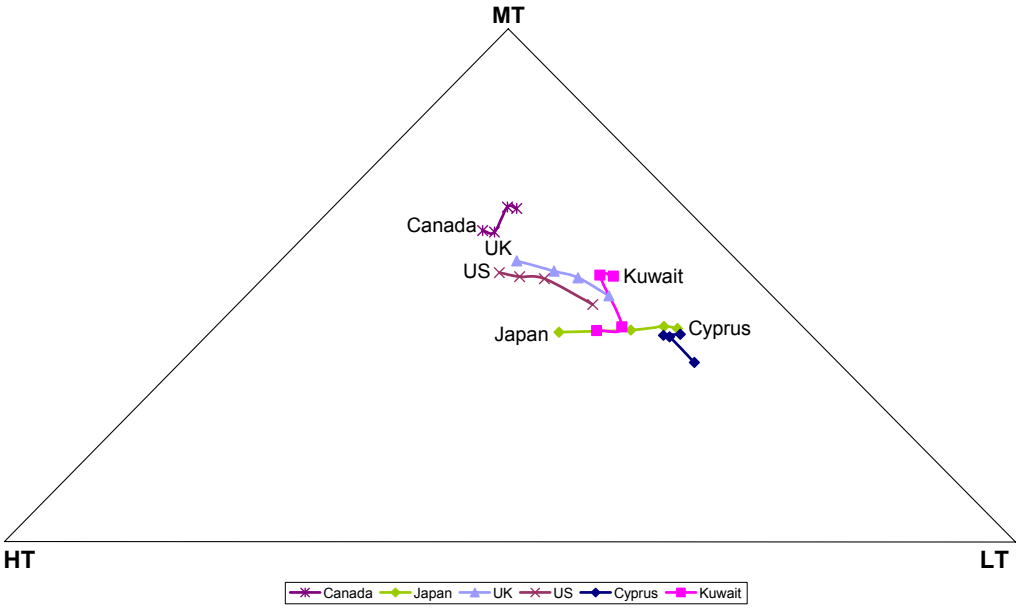


Figure III. 2. j. Import structure, selected high income countries, 1981-99.
Source: Industrial Demand Supply Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

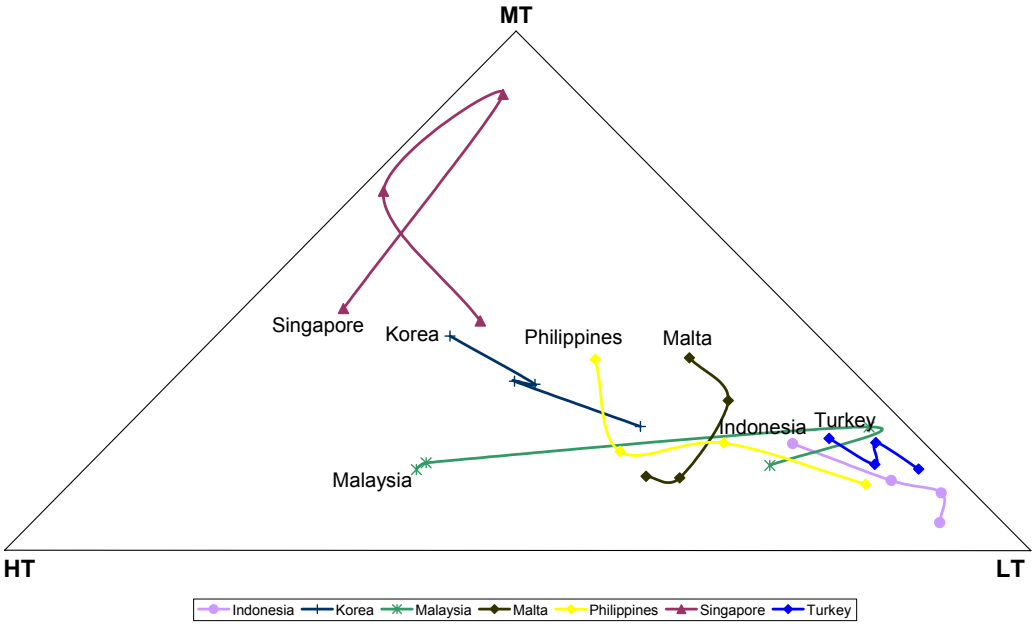


Figure III. 2. k. Export structure, fast growing countries, 1981-99.

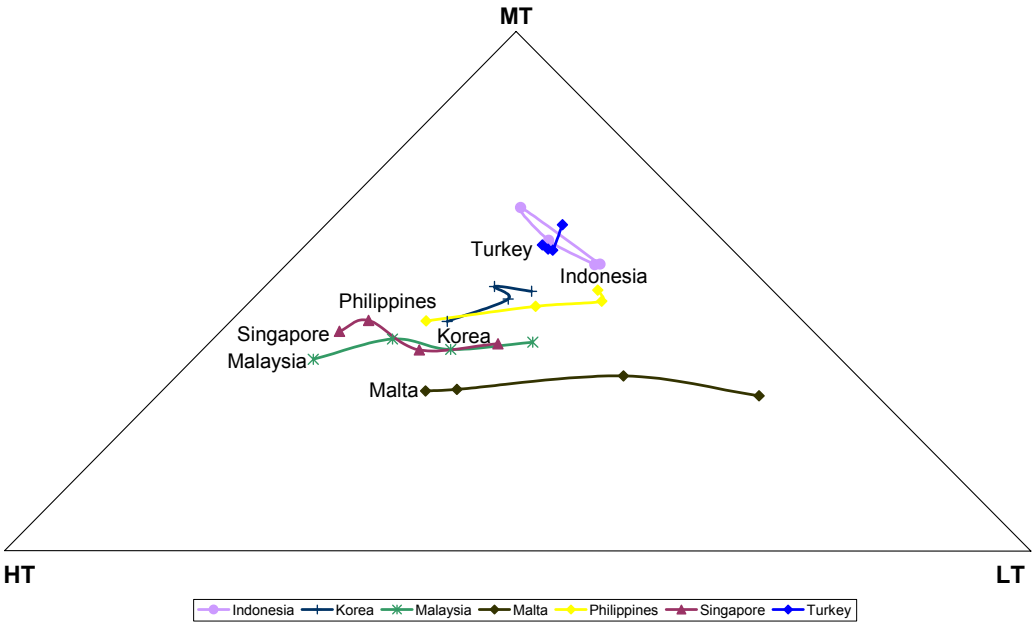


Figure III. 2. l. Import structure, fast growing countries, 1981-99.
Source: Industrial Demand Supply Database, Rev 2., 2002, UNIDO.
Legend: HT: High-technology; MT: Medium Technology; LT: Low-technology.

For the other high income group, the picture is different than European countries. As in the production of manufacturing, there is two distinct groups with respect to exports structure: while Kuwait and Cyprus have a export structure similar to middle income countries; US, UK, Canada, and Japan, on the other hand, have manufacturing industries mostly exporting middle and high technology intensive products (see Figure III. 2. i). Especially, the exports of Japan and US manufacturing industries are more technology intensive than the other high income countries. Among this high income country group, while Japan has the most high technology intensive exports structure, Canada has the least technology intensive exports structure than the other high income/industrialised countries. Lastly, we observed that the structure of exports of UK manufacturing in this country group is almost the same of that of Germany.

From 1981 to 1999, as regard to the technological structure of trade, fast growing countries are different than all country groups that exhibited both with heterogeneous distribution and dynamic structure. Radical changes in the composition of exports of manufacturing industries of Korea, Malaysia, Singapore, and Philippines are observed during the period under study (see Figure III. 2.k): While the share of low technology intensive exports decreased about two folds in the manufacturing industries of Korea, Malaysia, Singapore, and Philippines from the first to last period, the share of high technology intensive exports in total manufacturing in these countries increased from 22 to 46 percent in Malaysia, 22 to 30 percent in Korea, 26 to 37 percent in Singapore, and 08 to 20 percent in Philippines. The worst records in changing the structure of manufacturing towards more technology intensive exports in this country group turned out to be Indonesia, and Turkey. Contrary to the other country groups, the large share of high technology intensive imports in total manufacturing especially in Malta, Malaysia, Singapore, and Philippines may reflect the weight of assembly production and exports in total manufacturing to some extent.

In sum, first, countries export what they produce: There is, naturally, a one to one relationship between the structure of production and exports in manufacturing with respect to technology intensity. Second, there is a positive relationship between income level and more technology intensive exports structure: As income increases, the shares of medium and high technology intensive manufacturing exports increase at the expense of low technology intensive exports for most countries or *vice versa*. The structure of imports with respect to technology intensity, on the other hand, does vary much with the level of income.

III.3. The Evolution of Industrial Structures: Convergence vs. Divergence

We outlined, in the previous section, that countries have industrial structures with different technological dynamics through time. We observed, on the one hand, that the structure of manufacturing industries of some economies shifted toward more technology intensive production (Korea, Ireland, Malaysia, Israel, Singapore and etc.), some other economies, on the other hand, were not able to change significantly their industrial structure (Turkey, Venezuela, Uruguay, Costa Rica and the other low income countries except India). Not surprisingly, those who managed to change their industrial structure turned out to be either developed countries of today or the ones which have recorded remarkable growth rates and are the candidates to become developed countries in the future in normal circumstances.

This section, therefore, is devoted to find an answer to following question: Have the structures of manufacturing industries in various countries converged or diverged in the period of last 35 years? To be able to answer this question, we carried out factor analysis which allows us classify countries with respect to their industrial structure and observe the changes in this classification or the movements between these classes through time. Factor analysis allows one to

present the variables of interest as a linear combination of a few random variables, called *factor* (interested readers may refer to Rencher (2002) for more details). To some extent, factor analysis is a way of matrix reduction since it is hard to interpret the correlations in a matrix with a large dimension.

Factor analysis is carried out for both manufacturing production and trade for each period. Each period represents 5-year averages of industry shares. The variables used in the analysis was manufacturing value added, exports and imports share in total manufacturing. While manufacturing value added shares are used in the production case, for trade, both exports and imports shares were used at the same time. The sample includes 42 countries[1] with heterogeneous development stage and industrial structures consisting from 28 manufacturing industries.

The results of factor analysis carried out for manufacturing value added suggest that between 73 and 79 percent of the correlations among the industrial structures of the countries in our sample for the 7 periods may be explained with 3 factors (see Table III. 1). We assume that each factor represent a typical industrial structure. The results, thereby, imply that there are mainly 3 different country groups/clubs with respect to manufacturing industry structure (see Table III. 2). A better definition, in fact, would be two-plus-one rather than three distinct clubs for the reason that the plus-one club is more likely a transition club to which countries belongs for some time periods and eventually go to club one or two. The first club is mainly composed of industrialized countries of a certain time period (Canada, Finland, France, Germany, US, UK, and so on). The second club, on the other hand, is formed mostly by less industrialised countries i.e.; Ecuador, Chile, Colombia, Sri Lanka, Uruguay, and so on. The third club which we called the plus-one club, or transition club, consists of the countries that do

[1] In fact, we were able carry out the factor analysis for 50 countries for the manufacturing value added. However, in order not to loose the link between production and trade and compare the findings of the factor analysis carried out for manufacturing value added with manufacturing trade, we took those countries which have trade data expect for Ireland. Only country is included in the factor analysis of manufacturing value added is Ireland which does not have trade data but value added.

not belong to the other two clubs for a certain sub-period (Turkey, Portugal, Pakistan, Indonesia, Egypt, Morocco and so on).

The interpretation of the factor analysis tables for a given country will be as follows: Korea, for instance, was in the club of less industrialised countries (C2) in the first two periods. She, then, moved to the transition club (C3) in the 1975-79 period and stayed in this club for another period (1980-84). Korea took its place in the industrialised country club in the 1985-89 period and kept its place in this club in the rest of the periods that this study covers. Note that being in the club of industrialised countries for a country may not necessarily mean that this country is the same as the other countries in this club with respect to the level of industrialisation or development i.e, Indonesia, Malaysia, and India. What does this mean is that the structure of manufacturing industry of such a country is similar to those of the other countries in the same club.

The results of the factor analysis applied to manufacturing value added suggest that a general structural convergence tendency in manufacturing production does not appear from 1965 to 1999. The number of clubs has not changed during this period. The number of countries managed to change their membership from Club 2 or 3 to Club 1, the favourable club, is limited (India, Indonesia, Ireland, Korea, Malaysia, and Singapore)[2]. It's no coincidence that these countries, except for India, have achieved quite high growth rates in manufacturing industry during this period. Furthermore, this finding is supported by the previous section's findings that industrial structures of these countries have exhibited remarkable changes in favour of more technology intensive industries. We also found that the change in industrial structures and movement of these countries to the club of industrialised countries occurred in the post 1980 period for Korea, Malaysia, and Ireland and in the 1990s for India and Indonesia.

[2] It worth mentioning that China was an other country moving from club 2 to club 1 in the 1995-99 period. We didn't include this country in the analysis for the reason mentioned in footnote 2.

Table III. 1. Factor Analysis' eigenvalues and cumulative, 1965-99.

		1965-69		1970-74		1975-79		1980-84		1985-89		1990-94		1995-99	
		EV.	*Cum*	*EV.*	*Cum*	*EV.*	*Cum*	*EV.*	*Cum*	*EV.*	*Cum*	*EV.*	*Cum*	*EV.*	*Cum*
Factors	**1**	17.41	0.44	16.33	0.39	19.07	0.45	21.11	0.50	22.66	0.44	19.35	0.46	19.53	0.48
	2	7.66	0.63	10.12	0.63	8.65	0.66	8.33	0.70	11.46	0.66	10.04	0.70	9.85	0.72
	3	4.30	0.73	4.96	0.75	5.57	0.79	3.73	0.79	4.61	0.76	2.95	0.77	2.91	0.79
	4	2.78	0.80	2.74	0.81	2.22	0.85	2.04	0.84	3.09	0.80	2.88	0.84	2.40	0.85
	5	1.55	0.84	2.30	0.87	1.71	0.89	1.63	0.88	2.03	0.84	1.34	0.87	1.68	0.89
	6	1.21	0.87	2.20	0.92	1.56	0.92	1.21	0.91	1.83	0.88	1.29	0.90	1.39	0.92
	7	1.17	0.90	1.03	0.94	1.20	0.95	1.04	0.93	1.61	0.91	1.18	0.93	0.92	0.94
	8	0.88	0.92	0.87	0.97	0.69	0.97	0.71	0.95	1.21	0.93	0.81	0.95	0.72	0.96
	9	0.73	0.94	0.64	0.98	0.53	0.98	0.57	0.96	1.03	0.95	0.54	0.96	0.58	0.98
	10	0.66	0.96	0.54	0.99	0.39	0.99	0.39	0.97	0.86	0.97	0.54	0.97	0.39	0.99

Source: Calculated using Industrial Demand Supply Database, Rev 2., 2002, UNIDO.
Legend: EV: Eigenvalue, Cum: Cumulative proportions explained by the corresponding factors.

Table III. 2. a. Country clubs with respect to industrial structure, Industrialised countries, 1965-99.

	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99
C l u b 1 (Industrialised Countries)	***n.a.***	***C2***	***C3***	***C3***	***C3***	***C3***	***Indonesia***
	C2	***C2***	***C3***	***C3***	***C3***	***India***	***India***
	C2	***C2***	***C3***	***C3***	***Korea***	***Korea***	***Korea***
	C3	***C3***	***C2***	***C2***	***Malaysia***	***Malaysia***	***Malaysia***
	C2	***C2***	***C2***	***C2***	***Ireland***	***Ireland***	***Ireland***
	C3	***Singapore***	***Singapore***	***Singapore***	***Singapore***	***Singapore***	***Singapore***
	Austria	Austria	Austria	Austria	Austria	Austria	Austria
	Canada	Canada	Canada	Canada	Canada	Canada	Canada
	Finland	Finland	Finland*	Finland	Finland	Finland	Finland
	France	France	France	France	France	France	France
	Germany	Germany	Germany	Germany	Germany	Germany	Germany
	Italy	Italy	Italy	Italy	Italy	Italy	Italy
	Japan	Japan	Japan	Japan	Japan	Japan	Japan
	NL	NL	NL	NL	NL	NL	NL
	Norway	Norway	Norway	Norway	Norway	Norway	Norway
	Spain	Spain	Spain	Spain	Spain	Spain	Spain
	Sweden	Sweden	Sweden	Sweden	Sweden	Sweden	Sweden
	UK	UK	UK	UK	UK	UK	UK
	USA	USA	USA	USA	USA	USA	USA
	S. Africa	S. Africa	S. Africa	S. Africa	S. Africa	S. Africa	S. Africa
	Iceland	*Iceland*	*C2*	*C2*	*C2*	*C2*	*C2*

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: C1 (country club 1); C2 (country club 2); C3 (country club 3)
Note: [1] Rotated factor loadings is less than 0.3. Each row in the table belongs to each country. C1, C2, and C3 show the club of a country in that period.

Table III. 2. b. Country clubs with respect to industrial structure, Less Industrialised Countries, 1965-99.

Clubs (Less Industrialised Countries)	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99
	India	***India***	***C3***	***C3***	***C3***	***C1***	***C1***
	Korea	***Korea***	***C3***	***C3***	***C1***	***C1***	***C1***
	Ireland	***Ireland***	***Ireland***	***Ireland***	***C1***	***C1***	***C1***
	C3	***C3***	***Malaysia***	***Malaysia***	***C1***	***C1***	***C1***
	n.a.	***Indonesia***	***C3***	***C3***	***C3***	***C3***	***C1***
	Egypt	Egypt	C3	C3	C3	Egypt	Egypt
	Chile	Chile	Chile	Chile	Chile	Chile	Chile
	Colombia	Colombia	Colombia	Colombia	Colombia	Colombia	Colombia
	Costa Rica	Costa Rica	Costa Rica	Costa Rica	Costa Rica	Costa Rica	Costa Rica
	Ecuador	Ecuador	Ecuador	Ecuador	Ecuador	Ecuador	Ecuador
	Sri Lanka	Sri Lanka	Sri Lanka	Sri Lanka	Sri Lanka	Sri Lanka	Sri Lanka
	Uruguay	Uruguay	Uruguay	Uruguay	Uruguay	Uruguay	Uruguay
	C3	Philippines	Philippines	Philippines	Philippines	Philippines	Philippines
	C3	C3	Cyprus	Cyprus	Cyprus	Cyprus	Cyprus
	C3	C3	Honduras	Honduras	Honduras	Honduras	Honduras
	C1	C1	Iceland	Iceland	Iceland	Iceland	Iceland
	C3	C3	Jordan	Jordan	Jordan	Jordan	Jordan
	C3	C3	Panama	Panama	Panama	Panama	Panama
	Greece	Greece	C3	C3	C3	Greece	Greece
	Morocco	Morocco	C3	C3	C3	Morocco	Morocco
	C3	*C3*	Venezuela	Venezuela	Venezuela	Venezuela	Venezuela
	Malta	*Malta*	*Malta*[*]	*Malta*	*Malta*	*C3*	*C3*
	C3	*C3*	*Mauritius*	*Mauritius*	*Mauritius*	*C3*	*C3*
	Tunisia	*Tunisia*	*Tunisia*	*Tunisia*	*Tunisia*	*C3*	*C3*
	Pakistan	*Pakistan*	*C3*	*C3*	*C3*	*C3*	*C3*
	Portugal	*Portugal*	*C3*	*C3*	*C3*	*C3*	*C3*
	Turkey	*Turkey*	*C3*	*C3*	*C3*	*C3*	*C3*

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.

Legend: C1 (country club 1); C2 (country club 2); C3 (country club 3)

Note: [1] Rotated factor loadings is less than 0.3. Each row in the table belongs to each country. C1, C2, and C3 show the club of a country in that period.

Table III. 2. c. Country clubs with respect to industrial structure, Transition Club, 1965-99.

C l u b 3 (Transition Club)	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99
	Malaysia	***Malaysia****	***C2***	***C2***	***C1***	***C1***	***C1***
	C2	***C2***	***Korea***	***Korea***	***C1***	***C1***	***C1***
	C2	***C2***	***India***	***India***	***India***	***C1***	***C1***
	n.a	***C2***	***Indonesia***	***Indonesia***	***Indonesia***	***Indonesia***	***C1***
	Singapore	***C1***	***C1***	***C1***	***C1***	***C1***	***C1***
	C2	C2	C2	C2	C2	Malta	Malta
	Mauritius	Mauritius	C2	C2	C2	Mauritius	Mauritius
	C2	C2	Pakistan	Pakistan	Pakistan	Pakistan	Pakistan
	C2	C2	Portugal	Portugal	Portugal	Portugal	Portugal
	C2	C2	C2	C2	C2	Tunisia	Tunisia
	C2	C2	Turkey	Turkey	Turkey	Turkey	Turkey
	C2	*C2*	*Egypt*	*Egypt*	*Egypt*	*C2*	*C2*
	C2	*C2*	*Morocco*	*Morocco*	*Morocco*	*C2*	*C2*
	C2	*C2*	*Greece*	*Greece*	*Greece*	*C2*	*C2*
	Cyprus	*Cyprus*	*C2*	*C2*	*C2*	*C2*	*C2*
	Honduras	*Honduras*	*C2*	*C2*	*C2*	*C2*	*C2*
	Jordan	*Jordan*	*C2*	*C2*	*C2*	*C2*	*C2*
	Panama	*Panama*	*C2*	*C2*	*C2*	*C2*	*C2*
	Philippines	*C2*	*C2*	*C2*	*C2*	*C2*	*C2*
	Venezuela	*Venezuela*	*C2*	*C2*	*C2*	*C2*	*C2*

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: C1 (country club 1); C2 (country club 2); C3 (country club 3)
Note: [1] Rotated factor loadings is less than 0.3. Each row in the table belongs to each country. C1, C2, and C3 show the club of a country in that period.

In general, there is a consistent relationship between the findings of factor analysis and the analysis of the previous section which examines the industrial structure of economies and its evolution with respect to technology intensity. More explicitly, the countries having more dynamic industrial structures were able to change their place from either Club 2 or 3 to Club 1.

We also carried out a factor analysis for trade of manufactured goods for 41 countries for 4 periods[3]. The results of the factor analysis of trade are not much different than that of production. We, again, assumed that each factor represents a typical trade structure. We found four factors to be significant in explaining the correlations among trade structures of countries (see Table III. 3 for eigenvalues and cumulative proportions explained). However, we retained only the first three since the number of countries related with the fourth factor was very few (only two countries in the first two periods). Second, in doing so, we are able to compare and interpret the findings of the factor analysis applied to manufacturing trade with that of value added. With three factors, about 70-75 percent of the correlations among the trade structures of the countries in the sample is explained.

The results of the factor analysis applied to manufacturing industry trade is quite similar to that of production: First, a strong convergence pattern in the structure of trade between countries were not observed from1981 to 1999, but there are country clubs formed by the countries with similar trade structures (see Table III. 4. a-c). The countries in these clubs are quite slightly different from the clubs formed with respect to the structure of manufacturing value added above. In the first period of trade data (1981-85), for example, there is only one country, Netherlands, which is not in the club of industrialised countries constructed with respect to manufacturing trade structure. The factor analysis carried out with respect to manufacturing value added, on the contrary, proposed this country to

[3] Factor analysis carried out for four periods for the reason that the trade data was available form 1981 to 1999 for three digit ISIC level of manufacturing industry.

Table III. 3. Factor Analysis' eigenvalues and cumulative, trade, 1981-99.

		1981-84		1985-89		1990-94		1995-99	
		EV.	***Cum***	***EV.***	***Cum***	***EV.***	***Cum***	***EV.***	***Cum***
Factors	**1**	18.82	0.45	18.73	0.45	*19.01*	*0.46*	20.29	0.49
	2	7.02	0.62	6.82	0.61	*6.67*	*0.62*	6.93	0.65
	3	*3.33*	*0.70*	*4.12*	*0.71*	*4.24*	*0.72*	*3.89*	*0.75*
	4	2.25	0.75	2.61	0.77	*2.21*	*0.77*	2.01	0.79
	5	1.77	0.80	1.84	0.82	*1.74*	*0.81*	1.73	0.84
	6	1.53	0.83	1.46	0.85	*1.55*	*0.85*	1.47	0.87
	7	1.22	0.86	1.28	0.88	*1.13*	*0.88*	1.11	0.90
	8	0.99	0.88	1.02	0.91	*1.02*	*0.90*	0.85	0.92
	9	0.92	0.91	0.80	0.93	*0.89*	*0.92*	0.68	0.93
	10	0.82	0.93	0.78	0.94	*0.75*	*0.94*	0.59	0.95

Source: Calculated using Industrial Demand Supply Database, Rev 2., 2002, UNIDO.
Legend: EV: Eigenvalue, Cum: Cumulative proportions explained by the corresponding factors.

Table III. 4. a. Country clubs with respect to industrial structures, industrialised countries, 1981-99.

	1981-84	**1985-89**	**1990-94**	**1995-99**
Club 1 (Industrialised Countries)	***C3***	***C2***	***C2***	***Indonesia***
	C3	***C2***	***C2***	***Netherlands***
	C2	***C2***	***C2***	***Philippines***
	C3	***C3***	***C3***	***Portugal***
	C2	***C2***	***Malaysia***	***Malaysia***
	Austria	Austria	Austria	Austria
	Canada	Canada	Canada	Canada
	Finland	Finland	Finland	Finland
	France	France	France	France
	Germany	Germany	Germany	Germany
	Italy	Italy	Italy	Italy
	Japan	Japan	Japan	Japan
	Korea	Korea	Korea	Korea
	Norway	Norway	Norway	Norway
	S. Africa	S. Africa	S. Africa	S. Africa
	Singapore	Singapore	Singapore	Singapore
	Spain	Spain	Spain	Spain
	Sweden	Sweden	Sweden	Sweden
	UK	UK	UK	UK
	USA	USA	USA	USA

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: C1 (country club 1); C2 (country club 2); C3 (country club 3)
Note: [1] Rotated factor loadings is less than 0.3. Each row in the table belongs to each country. C1, C2, and C3 show the club of a country in that period.

Table III. 4. b. Country clubs with respect to industrial structures, less industrialised countries, 1981-99.

	1981-84	1985-89	1990-94	1995-99
C l u b 2 (Less Industrialised Countries)	***C3***	***Indonesia***	***Indonesia***	***C1***
	C3	***Netherlands***	***Netherlands***	***C1***
	Malaysia	***Malaysia***	***C1***	***C1***
	Philippines	***Philippines***	***Philippines***	***C1***
	C3	C3	C3	Morocco
	C3	C3	C3	Greece
	C3	C3	Jordan	Jordan
	Chile*	Chile	Chile	Chile
	Colombia	Colombia	Colombia	Colombia
	Costa Rica	Costa Rica	Costa Rica	Costa Rica
	Ecuador	Ecuador	Ecuador	Ecuador
	Honduras	Honduras	Honduras	Honduras
	Iceland	Iceland	Iceland	Iceland
	India	India	India	India
	Panama	Panama	Panama	Panama
	Uruguay	Uruguay	Uruguay	Uruguay
	C3	Venezuela	Venezuela	Venezuela
	Mauritius	*C3*	*C3*	*C3*

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: C1 (country club 1); C2 (country club 2); C3 (country club 3)
Note: [1] Rotated factor loadings is less than 0.3. Each row in the table belongs to each country. C1, C2, and C3 show the club of a country in that period.

Table III. 4. c. Country clubs with respect to industrial structures, 1981-99.

	1981-84	1985-89	1990-94	1995-99
C l u b 3 (Transition Club)	***Indonesia***	***Indonesia***	***Indonesia***	***C1***
	Netherlands	***C2***	***C2***	***C1***
	Portugal	***Portugal***	***Portugal***	***C1***
	C2	Mauritius	Mauritius	Mauritius
	Egypt	Egypt	Egypt	Egypt
	Cyprus	Cyprus	Cyprus	Cyprus
	Malta	Malta	Malta	Malta
	Sri Lanka	Sri Lanka	Sri Lanka	Sri Lanka
	Pakistan	Pakistan	Pakistan	Pakistan
	Tunisia	Tunisia	Tunisia	Tunisia
	Turkey	Turkey	Turkey	Turkey
	Greece	*Greece*	*Greece*	*C2*
	Morocco	*Morocco*	*Morocco*	*C2*
	Jordan	*Jordan*	*C2*	*C2*
	Venezuela	*C2*	*C2*	*C2*

Source: Industrial Statistics Database, Rev 2., 2002, UNIDO.
Legend: C1 (country club 1); C2 (country club 2); C3 (country club 3)
Note: [1] Rotated factor loadings is less than 0.3. Each row in the table belongs to each country. C1, C2, and C3 show the club of a country in that period.

be in the industrialised country club. Similarly, in the last period there are a few countries of which production and trade structure are not similar i.e.; India, Philippines and Portugal. One last observation, if it is not too speculative, is that the change in manufacturing trade structure lags one period behind the production structures in Korea, Indonesia, and Malaysia. That, in fact, is equivalent to saying that countries produce, and then export. In other words, a period of industrial development strategy based on import substitution may precede and lay the foundation of successful export performance.

In order to see the differences in industrial structures of the country clubs determined by the previous factor analysis based on manufacturing value added, the first nine industries with the largest share in total manufacturing value added together with its rank, technology intensity and orientations for three selected periods (1965-69, 1980-84, and 1995-99) are presented in Table III. 5.a-c. One should keep in mind in interpreting these tables that while the industrialised (Club 1) and less industrialised (Club 2) country clubs represent a typical and deterministic industrial structure, the transition club (Club 3) has varying properties and does not reflect a consistent industrial structure. Therefore, instead of presenting the results of this analysis for the transition club (Club 3), we accounted for the change in industrial structures of the countries moving to the club of industrialised countries at the last period from the other two clubs. In doing so, we are able to see how the structures of manufacturing industry of these countries change through time.

The results of this analysis have interesting implications: First, the first five industries with the largest shares in total manufacturing constitute about 50 percent of total manufacturing value added. Second, the figures imply that although the first five industries of the club 1 do not change from 1965 to 1999, but the rank of the industries, and thereby, technology intensity and orientations change. For instance, in the Club 1, the top one industry is the food industry with 11 percent share in total manufacturing value added in 1965-69 period, it falls to

Table III. 5.a: Industry rankings with respect to value added share in total manufacturing for different country clubs, 1965-69.

		1965-69			
	Rank	**Industry**	**Technology**	**Orientation**	**Share**
Industrialised Countries	1	311	LT	RI	0.11
	2	384	MT/HT	SI/SB	0.09
	3	382	MT/HT	SS/SB	0.09
	4	383	HT	SS	0.07
	5	381	LT	LI	0.07
	6	371	LT	SI	0.06
	7	321	LT	LI	0.05
	8	342	LT	RI	0.05
	9	341	LT	RI	0.05
				Total share	*0.63*
Less Industrialised Countries	1	311	LT	RI	0.17
	2	321	LT	LI	0.17
	3	313	LT	RI	0.07
	4	352	MT/HT	SI/SB	0.07
	5	314	LT	RI	0.05
	6	369	LT	RI	0.05
	7	381	LT	LI	0.04
	8	384	MT/HT	SI/SB	0.04
	9	353	LT	RI	0.04
				Total share	*0.68*
Catch-up Countries	1	311	LT	RI	0.12
	2	321	LT	LI	0.12
	3	384	MT/HT	SI/SB	0.06
	4	313	LT	RI	0.06
	5	353	LT	RI	0.05
	6	352	MT/HT	SI/SB	0.05
	7	314	LT	RI	0.05
	8	342	LT	RI	0.05
	9	355	MT	SI	0.04
				Total share	*0.60*

Source: Calculated from Industrial Statistics Database, Rev 2., 2002, UNIDO.

Legend: HT: High-technology; MT: Medium-technology; LT: Low-technology; RI: Resource-intensive; LI: Labour-intensive; SI: Scale-intensive; SS: Specialised-supplier; SB: Science-based.

Table III. 5.b: Industry rankings with respect to value added share in total manufacturing for different country clubs, 1980-84.

		1980-84			
	Rank	**Industry**	**Technology**	**Orientation**	**Share**
Industrialised Countries	1	382	MT/HT	SS/SB	0.11
	2	383	HT	SS	0.10
	3	384	MT/HT	SI/SB	0.10
	4	311	LT	RI	0.09
	5	381	LT	LI	0.07
	6	342	LT	RI	0.05
	7	371	LT	SI	0.05
	8	351	MT	SI	0.05
	9	341	LT	RI	0.05
				Total share	*0.65*
Less Industrialised Countries	1	311	LT	RI	0.20
	2	313	LT	RI	0.08
	3	353	LT	RI	0.07
	4	322	LT	LI	0.07
	5	369	LT	RI	0.06
	6	314	LT	RI	0.06
	7	321	LT	LI	0.05
	8	352	MT/HT	SI/SB	0.05
	9	381	LT	LI	0.04
				Total share	*0.69*
Catch-up Countries	1	311	LT	RI	0.11
	2	383	HT	SS	0.11
	3	321	LT	LI	0.08
	4	384	MT/HT	SI/SB	0.07
	5	382	MT/HT	SS/SB	0.06
	6	352	MT/HT	SI/SB	0.06
	7	314	LT	RI	0.05
	8	351	MT	SI	0.05
	9	353	LT	RI	0.05
				Total share	*0.65*

Source: Calculated from Industrial Statistics Database, Rev 2., 2002, UNIDO.

Legend: HT: High-technology; MT: Medium-technology; LT: Low-technology; RI: Resource-intensive; LI: Labour-intensive; SI: Scale-intensive; SS: Specialised-supplier; SB: Science-based.

Table III. 5.c: Industry rankings with respect to value added share in total manufacturing for different country clubs, 1995-99.

		1995-99			
	Rank	**Industry**	**Technology**	**Orientation**	**Share**
Industrialised Countries	1	382	MT/HT	SS/SB	0.12
	2	383	HT	SS	0.11
	3	384	MT/HT	SI/SB	0.10
	4	311	LT	RI	0.09
	5	381	LT	LI	0.07
	6	342	LT	RI	0.06
	7	352	MT/HT	SI/SB	0.06
	8	341	LT	RI	0.05
	9	351	MT	SI	0.04
				Total share	*0.70*
Less Industrialised Countries	1	311	LT	RI	0.22
	2	353	LT	RI	0.09
	3	313	LT	RI	0.08
	4	352	MT/HT	SI/SB	0.07
	5	369	LT	RI	0.06
	6	322	LT	LI	0.06
	7	314	LT	RI	0.05
	8	321	LT	LI	0.05
	9	351	MT	SI	0.04
				Total share	*0.70*
Catch-up Countries	1	383	HT	SS	0.17
	2	382	MT/HT	SS/SB	0.11
	3	311	LT	RI	0.08
	4	352	MT/HT	SI/SB	0.08
	5	384	MT/HT	SI/SB	0.07
	6	351	MT	SI	0.07
	7	321	LT	LI	0.05
	8	371	LT	SI	0.04
	9	381	LT	LI	0.04
				Total share	*0.72*

Source: Calculated from Industrial Statistics Database, Rev 2., 2002, UNIDO.

Legend: HT: High-technology; MT: Medium-technology; LT: Low-technology; RI: Resource-intensive; LI: Labour-intensive; SI: Scale-intensive; SS: Specialised-supplier; SB: Science-based.

4th rank with 9 percent share in the last period. In fact, from 1980-84 to 1995-99 even the rank of industries does not change in industrialised country club. Third, the change in the first nine industries and their ranks have changed most in both less industrialised and catch-up countries 1965 to 1999 (see Table III. 5. a-c).

We found that while the industries having the largest share in total manufacturing in the club of industrialised countries, Club 1, are mostly medium or high technology intensive industries, especially the first five industries, in the less industrialised country club, the value added is produced by low technology intensive industries in all periods. Accordingly, when the orientations of industries of the clubs are compared, we found that while the industries are mostly scale-intensive or specialised-supplier industries in the industrialised countries, they are resource or labour intensive industries in industrialised countries. On other interesting finding is that food industry (ISIC-311) which is a low technology and resource intensive industry and has a quite significant weight in total manufacturing in all clubs: its share is more than 10 percent even in the industries country club. This outcome may be justified as follows: properties of an industry may differ from one country to another with respect to especially technological structure. Food industry (ISIC-311) in an industrialised country, for instance, is not the same as the food industry in a less industrialised country with respect to both production and process technologies used even though it is defined as a low technology and labour intensive industry at the three digit ISIC level.

With respect to technological structure and orientations of industries, the most significant change is observed in the "catch-up" country club where the industrial structures evolved towards more technology intensive and specialised and science-based production (see Table III. 5. a-c) from 1965 to 1999. While textile (ISIC-321) and food (ISIC-311) industries (low technology and labour and resource intensive industries), for example, constitute about 24 percent of total manufacturing value added in the period of 1965-99 in this country group, their share decreased to 13 percent at the end of 1990s. Similarly, Office &

Computing Machinery and Machinery & Equipment (ISIC-382) and Radio, TV & Communication Equipment and Electrical Machinery (ISIC-383) were not observed among the top nine industries in the first period, their share in total manufacturing increased incredibly to 28 percent in the period of 1995-99.

Examination of the evolution of the structure of exports with respect technology intensity and orientations gives no different results than that of production. We found that while less industrialised countries did not experience significant changes in technological structure of their exports, the structure of manufacturing industry of catch-up countries shifted towards more technology and skill intensive exports from 1981 to 1999 (see Table III. 6.a-b). Major changes in the structure of exports of manufacturing industry of industrialised country group, indeed, are not observed, i.e, the rank of the industries did not change a lot. We found, on the other hand, that the share of technology intensive exports has increased during 1980s and 1998s. The share of technology intensive exports (ISIC-382, ISIC-383, and ISIC-384) increased from 37 percent in 1980-84 to 46 percent in 1995-99 period. Among these industries, only ISIC-383 (Radio, TV & Communication Equipment and Electrical Machinery) has a share of 3 percent in total manufactured exports both in the beginning and end of period (see Table III. 6.a-b).

In the group of catch-up countries, the share of high technology exports raises on the one hand, low technology exports fell radically from 1981 to 1999 on the other. The shares of ISIC-382 (Office & Computing Machinery and Machinery & Equipment) and ISIC-383 (Radio, TV & Communication Equipment and Electrical Machinery) in total manufacturing exports, for instance, increased to 12 and 24 percent in the last period from the beginning levels of 7 and 14 percent, respectively. At the same time, the exports of food industry (ISIC-311) decreased from 16 to 8 percent at the second half of the 1990s.

Table III. 6. a: Industry rankings with respect to export share in total manufacturing for different country clubs, 1980-84.

		1980-84			
	Rank	**Industry**	**Technology**	**Orientation**	**Share**
Industrialised Countries	1	384	MT/HT	SI/SB	0.15
	2	382	MT/HT	SS/SB	0.13
	3	351	MT	SI	0.09
	4	383	HT	SS	0.09
	5	371	LT	SI	0.07
	6	341	LT	RI	0.07
	7	311	LT	RI	0.06
	8	353	MT	RI	0.05
	9	372	MT	RI	0.05
				Total share	*0.79*
Less Industrialised Countries	1	311	LT	RI	0.33
	2	353	MT	RI	0.15
	3	322	LT	LI	0.10
	4	372	MT	RI	0.07
	5	321	LT	LI	0.05
	6	351	MT	SI	0.05
	7	331	LT	SI	0.04
	8	383	HT	SS	0.03
	9	352	MT	SI	0.03
				Total share	*0.88*
Catch-up Countries	1	311	LT	RI	0.16
	2	353	MT	RI	0.15
	3	383	HT	SS	0.14
	4	321	LT	LI	0.10
	5	331	LT	SI	0.07
	6	382	MT/HT	SS/SB	0.07
	7	322	LT	LI	0.06
	8	371	LT	SI	0.06
	9	384	MT/HT	SI/SB	0.05
				Total share	*0.89*

Source: Calculated from Industrial Statistics Database, Rev 2., 2002, UNIDO.

Legend: HT: High-technology; MT: Medium-technology; LT: Low-technology; RI: Resource-intensive; LI: Labour-intensive; SI: Scale-intensive; SS: Specialised-supplier; SB: Science-based.

Table III. 6. b: Industry rankings with respect to export share in total manufacturing for different country clubs, 1995-99.

		1995-99			
	Rank	**Industry**	**Technology**	**Orientation**	**Share**
Industrialised Countries	1	382	MT/HT	SS/SB	0.17
	2	384	MT/HT	SI/SB	0.15
	3	383	HT	SS	0.14
	4	351	MT	SI	0.07
	5	341	LT	RI	0.06
	6	371	LT	SI	0.04
	7	311	LT	RI	0.04
	8	352	MT/HT	SI/SB	0.04
	9	372	MT	RI	0.04
				Total share	*0.78*
Less Industrialised Countries	1	311	LT	RI	0.25
	2	322	LT	LI	0.11
	3	353	LT	RI	0.09
	4	321	LT	LI	0.07
	5	372	MT	RI	0.07
	6	351	MT	SI	0.07
	7	352	MT/HT	SI/SB	0.05
	8	383	HT	SS	0.03
	9	341	LT	RI	0.03
				Total share	*0.80*
Catch-up Countries	1	383	HT	SS	0.24
	2	382	MT/HT	SS/SB	0.12
	3	321	LT	LI	0.10
	4	311	LT	RI	0.08
	5	351	MT	SI	0.07
	6	384	MT/HT	SI/SB	0.05
	7	322	LT	LI	0.05
	8	331	LT	SI	0.05
	9	353	LT	RI	0.04
				Total share	*0.82*

Source: Calculated from Industrial Statistics Database, Rev 2., 2002, UNIDO.

Legend: HT: High-technology; MT: Medium-technology; LT: Low-technology; RI: Resource-intensive; LI: Labour-intensive; SI: Scale-intensive; SS: Specialised-supplier; SB: Science-based.

III. 4. Summary

We draw the picture showing the existence of strong correlation between industrial structure and industrial performance. While less developed countries have an industrial structure composed of low technology production and exports, industrial structure of industrialised countries consist mostly of medium and high technology production and exports. More importantly, we showed that the countries with high growth performance, fast growing countries, in this period have more dynamic industrial structure in favour of technologically sophisticated industries. They, thereby, were able shift their industrial structure radically towards medium and high technology industries with respect to both production and exports.

This chapter has also provided the facts on the evolution of industrial structure and its relationship with industrial development. The findings suggest that there is no evidence of strong convergence with regard to industrial structure. On the contrary, our analysis showed the existence of three different clubs with respect to the countries' production and trade structure and mostly consistent with the development stage of countries. While one of these clubs is composed of less developed countries in a given time period, the other turned out to be a club mostly formed by developed countries. The countries managed to move to the club of developed countries out of the other clubs were the countries performing high growth rates like Korea, Ireland, Portugal, and Singapore.

The findings, hence, may seem to suggest that there is an international division of labour with respect to industrial production and trade. More explicitly, this is to say that while less developed countries specialise in low technology, low skill, labour and resource intensive industrial activities, developed countries maintain their diversified industrial composition with specialisation in more technology and skill intensive production and exports. Hence, the working of the world

economy seems to sustain the polarized grouping of countries as “industrialised” and “less industrialised”.

Investigation of the rank (share) of each industry in total manufacturing with regard to both production and exports has revealed interesting implications: while the industries having the largest share in total manufacturing in the club of industrialised countries, are mostly medium or high technology intensive industries, especially the first five industries, in the less industrialised country club, the value added is produced and exported by low technology intensive industries in all periods..

With respect to technological structure of industries, the most significant change is observed in the “catch-up” country club where the industrial structures evolved towards more technology intensive and specialised and science-based production from 1965 to 1999. While textile and food industries (low technology and labour and resource intensive industries), for example, constitute about 24 percent of total manufacturing value added in the period of 1965-99 in this country group, their share decreased to 13 percent at the end of 1990s. Similarly, while industries producing high technology products (Office & Computing Machinery and Machinery & Equipment and Radio, TV & Communication Equipment and Electrical Machinery) were not observed among the top nine industries in the first period, their share in total manufacturing increased incredibly to 28 percent in the period of 1995-99.

All these findings provide evidence on the link between technological structure of manufacturing production and exports and the level of industrialisation.

CHAPTER IV

LABOUR MARKET REGULATION AND ECONOMIC PERFORMANCE

> *time spent worrying about strict labour market regulations, employment protection and minimum wages is probably time largely wasted (Nickell and Layard, 1999: 3080)*

IV.1. Introduction

The importance of the relationship between labour market institutions and economic performance has attracted great attention by the economists and policy makers especially in the last decade as the production method of most industries has shifted from mass-production to flexible production. Labour market flexibility/rigidity, therefore, has become a key factor in the issues of labour market and economic performance. Many economists blamed labour markets for high unemployment and/or low output. However, as Nickell (1997) states;

> *European unemployment is high because European labour markets are "rigid" is too vague and probably misleading. Many labour market institutions that conventionally come under the heading of rigidities have no observable impact on unemployment. (Nickel, 1997: 73)*

Labour market institutions and their functioning may have important consequences for the firms' innovativeness and productivity that, in turn, shapes the performance of an industry or an economy since they determine the direct costs of labour input and adjustment costs of the firm on the one hand, and the welfare of the workers on the other at the first glance. The bulk of studies on labour market institutions, on the other hand, usually investigate the relationship between these institutions and unemployment.

This study aims to investigate the relationship between labour market regulation and economic performance, measured by labour productivity in manufacturing industry. The main question to be answered is the following: Can we explain the performance differentials of economies with respect to their structure of labour market which is determined by the existing labour market institutions and their workings? In other words, "is there a relation between the degree of labour market regulation and/or flexibility and economic performance?"

In order to find an answer to the question above, we first construct a new index to approximate the degree of labour market regulation by using ILO (International Labour Organisation) Natlex (2002) database of national labour, social security and related human rights legislation. This new index, based on the number of laws regulating labour markets, was constructed for 52 countries and 7 time spans from 1965 to 1999. To the best of our knowledge, this is the second attempt in constructing a labour market regulation/flexibility index with a panel nature. The first one is the database of labour market indicators prepared by Rama and Artecona (2002) who used the data on the ratification of core ILO conventions. In order to study the relationship between labour market structure and performance of economies, we also made use of 2002-UNIDO Industrial Statistics Database at three digit ISIC level. Finally, in order to group countries in the sample with respect to their income level we used World Development Indicators 2002.

Organisation of this chapter is as follows: In the next section, we summarize various definitions of labour market flexibility. We discuss labour market flexibility-regulation economic performance nexus in section three. In section four, we construct a new labour market regulation index and present a descriptive analysis of labour market regulation. Section five investigates the relationship between labour market regulation and wage, productivity, and the rate of profit-share and their differentials. In the sixth section, we examine the impact of the structure of both labour markets and manufacturing industry. Finally, we summarize the findings of this chapter in section seven.

IV. 2. Defining Labour Market Flexibility

At the most abstract level, flexibility can be defined as the degree of responsiveness to the changing conditions. Formally, "flexibility may be defined as the ability to take up different positions or alternatively to adopt a range of states" (Slack 1983 in Taymaz, 1988: 1891). More extensively, Bahrami (1992) defines the concept of flexibility as "the ability to precipitate intentional changes, to continuously respond to unanticipated changes, and to adjust to the unexpected consequences of predictable changes" (in Sarker *et al*, 1994 513). Therefore, a system or agent may be attributed as flexible if it is able to cope with the uncertainty of change efficiently (Tincknell and Radcliffe, 1996: 20).

Labour market flexibility refers to the changes and adjustments in the price, quantity and quality of labour input (Standing, 1986: 59). According to Molleman and Slomp (1999: 1838), labour flexibility refers to the responsiveness of the labour system to variation in the supply and demand of labour. In the context of labour economics, flexibility may firstly be divided into two broad categories: External and internal flexibility. External flexibility examines the flexibility of labour markets and includes labour cost flexibility, or wage flexibility, and labour mobility (OECD, 1986: 90). Labour cost flexibility refers to the degree at which wages adjust to clear the labour markets. Labour

mobility, on the other hand, refers to the movement of people between jobs, occupations, industries and geographic areas (OECD, 1986: 90). Internal flexibility, however, refers to the notion of flexibility internal to the firm. In other words, internal flexibility refers to the flexibility in work practices within the firm. Internal labour flexibility has two major dimensions: Numerical and functional flexibility. Numerical flexibility (quantitative flexibility) includes the adjustment of the quantity of labour input according to changing conditions. Numerical flexibility, in fact, can be attained by mainly three types of adjustment: Numerical adjustment may take place by the form of hiring or firing workers, flexible working time arrangements, temporary employment, and some other type of non-standard employment relations. Numerical flexibility may have both internal and external dimensions. Functional flexibility (also known as qualitative flexibility) should be understood more as internal flexibility. Functional flexibility involves the reduction or elimination of horizontal and/or vertical demarcations between job classifications and the consequent development of multi-skilled employees (Horstman, 1988: 412). In the case of functional flexibility, labour is treated as more homogeneous and changes in skill requirements are achieved mainly through training, redefinition of occupations and reassignment of workers (OECD, 1986: 90).

IV.3. Labour Market Regulation and Economic Performance

There is no doubt that productivity increase is the main source of the economic growth and increased living standards. To some extent, productivity increase is a function of existing industrial relations structure. Industrial relations structure, in turn, is determined by the workings of the labour market institutions. Therefore, this study suggests that labour market institutions and their workings matter for productivity growth. The literature, however, suggest no clear-cut explanations on the relationship between the workings of labour market institutions and productivity growth. On the one hand, rigid labour markets may lead to inefficient allocation of resources. However, when product and factor markets

are not perfectly competitive, then fully flexible labour market will not ensure the optimum allocation of all resources, including labour (OECD, 1994 and 1996; Salvanaes, 1997, Scarpette and Tressel, 2002). On the other hand, having a more regulated labour market will tend to induce human capital accumulation through a variety of mechanisms, and thus increased productivity and growth (Cahuc and Michel, 1996: 1464).

We argue that more regulated labour markets lead to lower numerical and wage flexibility on the one hand, it may increase functional flexibility on the other. Increased functional flexibility, accordingly, will contribute firms overall flexibility by increasing both manufacturing[1] and managerial flexibility[2]. Thus, firms may operate in an efficient and productive way leading to an overall increased productivity. Think of minimum wage legislation as the specific case: Acemoglu and Pischke (1999) show that, in non-competitive labour markets, existence of minimum wages can increase training investments of firms since they compress the wage structure. The intuition behind this outcome is that minimum wages make it more costly to employ unskilled labour for the firm. Thus, while existence of minimum wage legislation decreases wage flexibility, by leading a wage level higher than the competitive level, it increases functional flexibility by increasing training investments of firms since training helps both skill upgrading and new and/or multi-skill formation of the workers. Arulampalam and Booth (1998) found also that there is a trade-off between labour market flexibility and work-related training. Increase in functional flexibility will then help the firm to operate more productively by promoting manufacturing and managerial flexibilities. On the contrary, if the labour market

[1] Manufacturing flexibility refers to the ability of a system or organization to adapt to changes (Sarker *et al*, 1994 518). In the context of this study, manufacturing flexibility may be defined as the ability of a firm to change its production method, product quality and quantity to adapt predictable and unpredictable changes in the business environment easily and rapidly. Manufacturing flexibility of a firm is determined by the degree of production and labour flexibilities. While production flexibility is assumed to depend mainly on three types of sub-flexibilities (machine, routing, and process flexibility), labour flexibility is determined by numerical and functional flexibilities.

[2] Managerial (organizational) flexibility represents the ability of the firm to change or restructure its organizational or managerial structure in the presence of changing business conditions and environment.

is flexible enough, than firms could prefer to move towards the use of subcontractors and temporary workers rather than training their workers (Standing, 1986: 65).

Similarly flexible labour markets may not necessarily lead to increased productivity and growth in the long run. Moreover, according to Kleinknecht (1998), removing labour market rigidities may indeed be advantageous for firms in the short run, yet it is harmful in the long run since removing institutional rigidities in the labour market discourages product and process innovation, and thereby reduces productivity growth. Reduced innovation efforts and productivity growth, in turn, will have negative impact on the economic performance and employment for any open economy (Kleinknecht, 1998: 387). More specifically, both flexible wage-formation process and/or relaxation of employment protection legislation will discourage innovative efforts since they will give extra advantages to non-innovation firms in order to compete with the innovating firms (Kleinknecht, 1998: 394). Slightly differently, but supportively, Bassanini and Ernst (2002) found a negative relationship between labour market flexibility and R&D intensity in industries with more cumulative knowledge base.

In fact, labour market institutions may have different effects on productivity in different economies and different time periods. While an institution has a positive effect on productivity in an economy, it is possible to have the same institution affect productivity adversely in another economy. Unions, for example, may both enhance or detract from productivity performance of a firm (Metcalf, 2002; Nickell 1999). If unions adopt a policy of reducing wage differentials among the workers and occupations, productivity increase may be affected negatively. The intuition behind this argument is that, wage inequality results from skill-biased technical change, and skill biased technical change leads to increased productivity (Acemoglu *et al*., 2001: 2). However, if unions act in a cooperative rather than adversarial manner, these negative effects may be nullified (Nickel, 1997: 68).

IV. 4. Construction of a Labour Market Regulation Index

In his review article, Sala-I Martin (1997) identified 63 variables that had been used in the empirical literature explaining long-run growth across countries, but none of these variables referred to labour markets (Rama and Artecona, 2002).

Labour market institutions and their workings are vital in explaining growth performance of economies, since they simply shape the industrial relations environment, and thereby production, productivity, and profitability of the firm/industry/economy on the one hand, and the welfare of the workers on the other. In fact, non-existence of labour market institutions in growth equation, as emphasized by Rama and Artecona (2002), is not because of its unimportance but mostly because of its unavailability.

There have been some attempts by both researchers and international institutions in preparing a labour market regulation/flexibility index, but still there is no acceptable and accurate index. Some of the shortcomings of the existing databases on the labour market institutions may be as follows: First, existing databases usually ignore the time dimension of the issue, and include the data across countries at a certain point in time. Second, they have been constructed for a smaller number of countries, or mostly for industrialised countries. Third, they were usually constructed with respect to smaller number of subjects i.e., employment protection, minimum wages, mandated benefits and so on. Fourth, they cover only a smaller amount of working population and establishments/industries (Taymaz and Özler, 2004).

Labour market flexibility index of World Bank (2003), employment protection legislation index of Nicoletti, Scarpetta, and Boylaud (1999), and Botero, Djankov and others (2003) are some of the existing databases measuring the labour market regulation/flexibility. These, however, are cross sectional database. The only database with a panel structure is the one prepared by Rama and Artecona (2002). This database is based on the ratification of ILO's

(International Labour Organisation) conventions on various subjects by the countries along with some other measures of labour market flexibility/rigidity i.e., minimum wage, the number of trade union membership and so on. The shortcoming of this database is the lack of "completeness" that the available data on different variables cover small number of countries and short time periods.

That is why we attempted to construct a new index reflecting the degree of labour market regulation in this thesis. The proposed index, derived from ILO Natlex database 2002, is not a direct index but an approximation and based on the number of laws on 100 different subjects passed by the governments. It includes 60 countries from 1960 to 2000.

In constructing the database, we first collected the number of laws on different subjects from 1960 to 2000 for each country in the database. We recorded the number of laws issued before 1960 in the year 1960. We summed the number of laws on each subject over 5 years under 13 main subject titles defined by ILO. We, then, assumed that each law is effective for 15 years. We, therefore, took cumulative of three periods with the exception of second period (1965-69). The second was composed of the first two periods (1960-64 and 1965-69).

In order to find the correlations among the subjects of laws and reduce their number, we carried out a factor analysis for the whole period and two sub-periods, the pre and post-1980 periods. The factor analysis results showed that there are mainly two groups of legislation with respect to their subjects for the whole period: while one of them includes legislation on general provisions i.e., human rights, industrial relations, social security, and so on, the other consisted of the laws mostly regulating production and work relations i.e., conditions of employment, conditions of work, labour administration, and so on. When two sub-periods are examined, we found that correlations between indices change from the pre to post 1980 period. Therefore, we collected legislation under four broad categories with respect to their subjects. These categories are as follows:

1. Legislation on production and work relations:
    - Subject group 1 (LAW1):
        i. conditions of employment,
        ii. labour administration,
        iii. training.
    - Subject group 2 (LAW2):
        i. conditions of work,
        ii. economic and social development,
        iii. employment
2. Legislation on general provisions:
    - Subject group 3 (LAW3):
        i. human rights,
        ii. industrial relations,
        iii. occupational safety and health,
        iv. social security,
        v. special provisions by category of persons.
    - Subject group 4 (LAW4):
        i. general provisions,
        ii. special provisions by sector of economic activity.

IV.4.1. Limitations and deficiencies of the proposed labour market regulation index

Limitations, deficiencies, and measurement errors are inherited in any database. If this is a labour market database, life gets even harder. This index on the structure of labour markets also comes with its own problems: First, to proxy the degree of labour market regulation with the number of laws issued is a very strong assumption. Any law, on the contrary, may also deregulate the labour market. In order to construct a labour market regulation index, in fact, one has to examine not only quantitative aspects of the legislation but also the qualitative aspects. However, in constructing an index for 40 years and 60 countries, this

does not seem to be feasible. Therefore, by regulation, we do not imply that increased/decreased regulation leads to higher rigidity/flexibility in the labour markets. We argue that regulation, proxied by the number of laws regulating labour markets, leads probably to lower numerical flexibility and higher functional flexibility. From this perspective, the proposed labour market regulation index does not directly measure the degree of labour market flexibility or rigidity but adaptability of labour markets to changing circumstances. Note that adaptability is a broader concept than labour market flexibility (Taymaz and Özler, 2004). Adaptability of labour markets provides "protection against uninsurable labour market risk, training across the possible labour market states, preserve an adequate degree of mobility, and ensure a sizeable labour force" (Boeri *et al*., 2002: 25)

We assumed that the impact of each law on the labour markets erodes due to chancing circumstances in the national economy and international environment in around fifteen years. That is another controversial assumption since there is no guarantee that each law is to be effective for fifteen years. A law, indeed, may be effective for more than fifteen years or less.

In spite of these deficiencies, examination of the relationships between the proposed labour market regulation index and the other variables such as wage differentials, gave rise to plausible findings.

IV. 4. 2. Descriptive analysis of labour market legislation

We grouped the countries into five categories on the basis of their per-capita income level, the degree of regulation, and growth performance. The countries in the sample are, first, divided into two groups with respect to their income level as low and high income countries[3]. We, then, divide each income group with

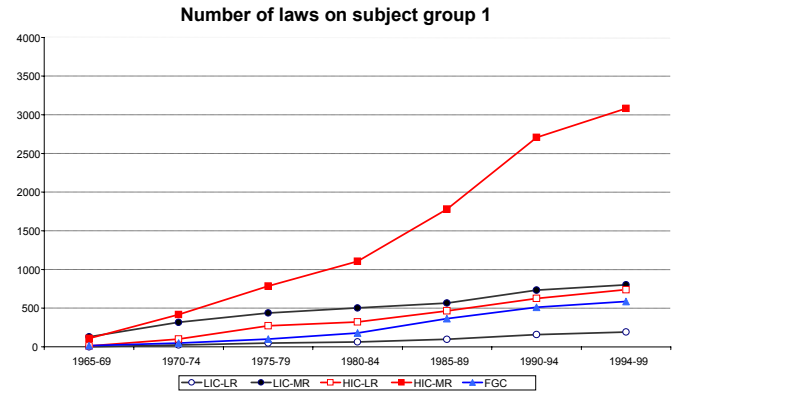
[3] A country regarded as high/low income if its GNI per-capita is greater/less than $9205 in 1999 by using 2002 World Development Indicators Database of the World Bank.

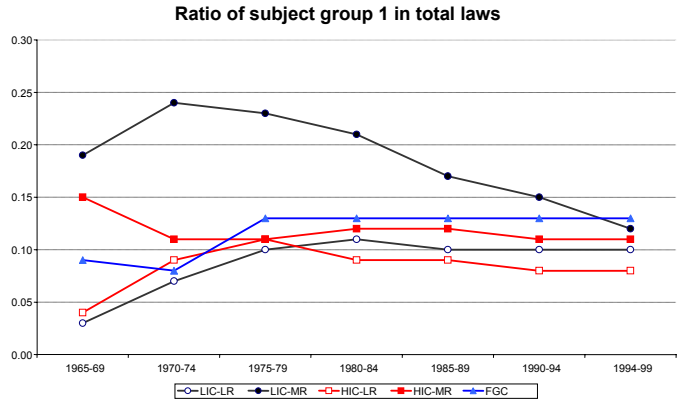
respect to their degree of labour market regulation as *"above"* and *"below"* the median. Thus, we classified countries *above*/*below* the median as countries with more/less regulated labour market. In addition to these groups, the fast growing countries from 1965 to 1999 constituted the last country group.

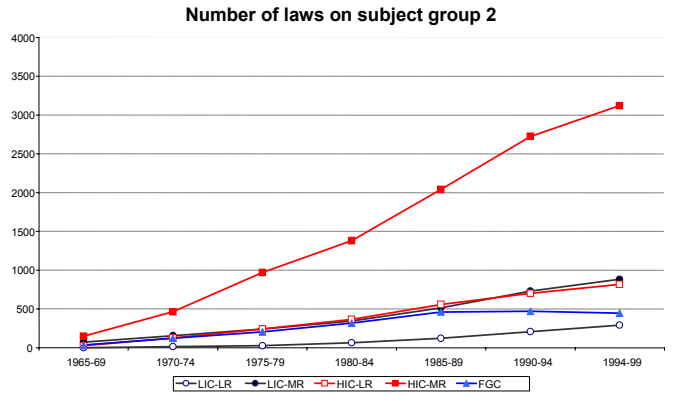
The Figure IV. 1 depicts the number of laws enacted in the period under study for each subject group and their share in total laws. The figures imply that the number of laws on general provisions (subject groups 3 and 4) is much higher than those on production and work relations (subject groups 1 and 2) (see Figure IV. 1). Second, while the number of laws in the high income countries with more regulated labour markets (above the median) is much higher than the other country groups, the number of laws in the high income countries with less regulated labour markets (below the median) is almost the same as those in low income countries more regulated labour markets for all subject groups. Third, the fast growing countries always stand a little bit above the low income countries with less regulated labour markets from 1965 to 1999 with respect to the number of laws passed.

Investigation of the evolution of the number of laws reveals that the number of laws increases much between 1980-84 and 1990-94 periods and decreases in the last period (1995-99) in high income countries with more regulated labour markets in all subject groups. In the other country groups, observed variations between periods are not much higher. One last important finding, to some extent, is that in the fast growing countries while the number of laws on general provisions increases in the post-1980 period, the number of laws on production and work relations showed a sharp decrease after the mid-1980s.

There are slight differences among country groups when the shares of subject categories in total number of laws are inspected. We found that the shares of laws on production and work relations have showed a converging pattern among country groups. The only exception is the subject group 2 (conditions of work, economic and social development, and employment) in the low income countries







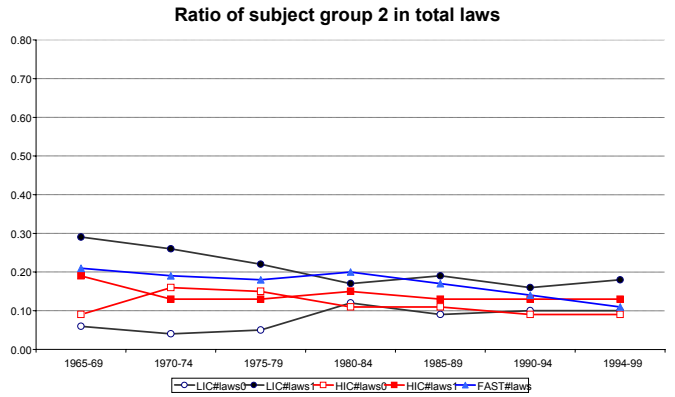
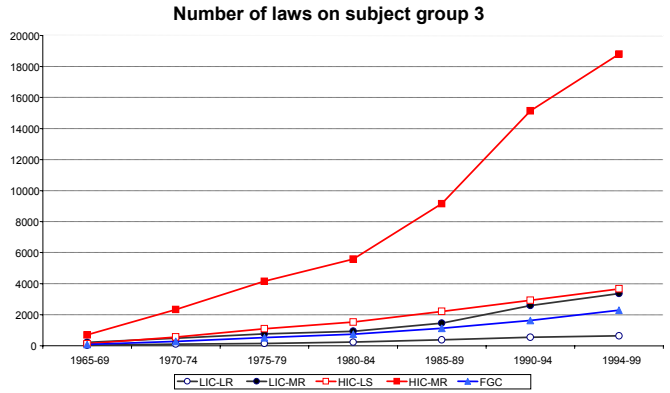


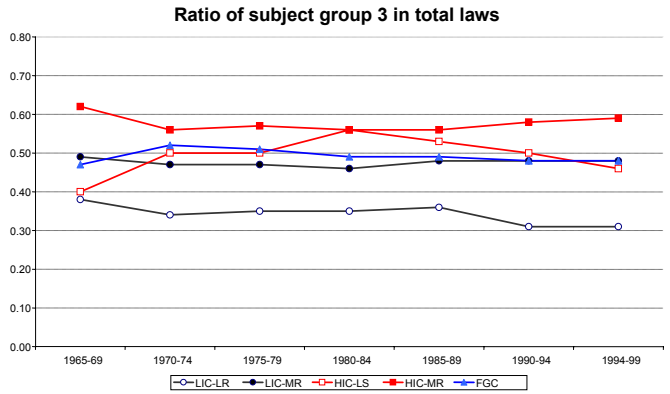
Figure IV. 1. Laws on specific provisions (subject group 1: conditions of employment, labour administration, and training) and (subject group2 :conditions of work, economic and social development, and employment), 1965-99.

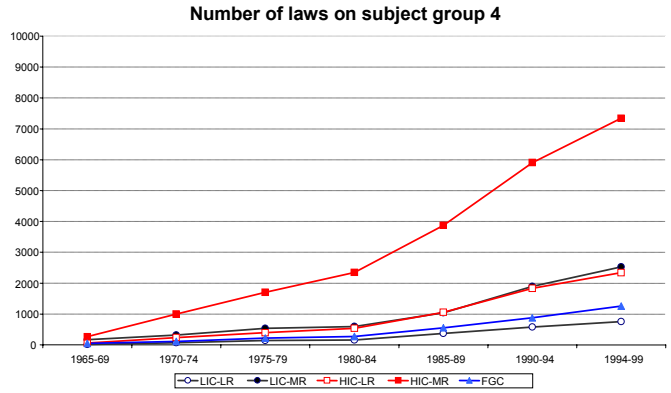
Source: Author calculations based on ILO-Natlex database, 2002.

Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).

Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.







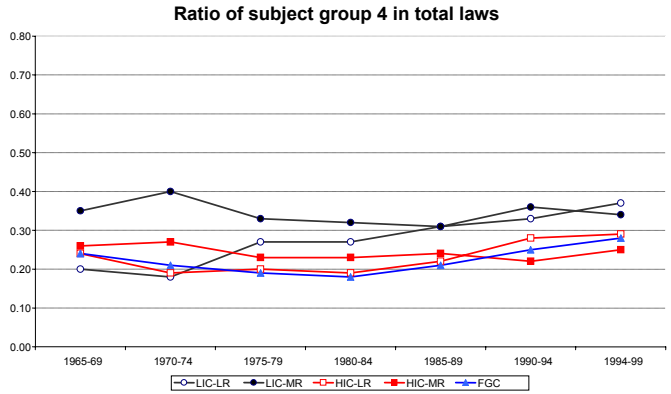


Figure IV. 1 (cont.): Laws on general provisions (subject group 3: human rights, industrial rel., occup. safety and health, social sec., spec. prov. by categ. of persons.) and (subject group 4: general provisions, and special provisions by sector of economic activity.)

Source: Author calculations based on ILO-Natlex database, 2002.

Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).

Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.

above the median has larger share in all periods. In the fast growing country group, the decreasing pattern of the share of the subject group 2 in total laws is again an interesting finding.

The findings on the shares of subjects groups on general provisions is mixed: while the share of subject group 3 (human rights, industrial relations, occupational safety and health, social security, and special provisions by category of persons) is higher in high income countries above the median, it reverses in the subject group 4 (general provisions, and special provisions by sector of economic activity). Interestingly, low income countries have the highest share in this subject group.

IV. 5. Labour Market Regulation, Productivity, Wages and Profits

Figure IV. 2 presents the relationship between the labour market regulation and the level of labour productivity, wage, and the share of profit in manufacturing value added for different country groups. The findings are as follows:

First, labour productivity in manufacturing industry is higher in high income countries than both low income and fast growing country groups. In spite of its small magnitude, labour productivity is higher in economies with more regulated labour markets (see especially subject groups 2, 3 and 4 in Figure IV. 2). We observe a significant amount of productivity increase in the fast growing countries and a departure from the low-income country group especially in the post-1980 period. For the low income country group, on the other hand, the picture is mixed: There is a divergence among low income countries in the post 1980 period in the subject group 3 and 4 with regard to productivity increase. We found, in this period, that less regulated countries with respect to general provisions (subject groups 3 and 4) showed productivity decreases while countries with more regulated labour markets experienced productivity growth.

The link between the degree of labour market regulation and the average wage level in manufacturing is consistent with our a priori expectation that more regulated labour markets lead to higher wages in manufacturing before 1990s. However, contrary to our expectations the difference in wage levels in manufacturing industry of high income countries with different degree of regulation has converged especially in the 1990s (see Figure IV. 2). In contrast to high income country group, although there is no direct relationship between the wage level and labour market regulation in the low income group before the 1980s, average wages are much higher in countries with more regulated labour markets especially in the area of general provisions (subject groups 3 and 4) in the post-1980 period. Lastly, we found persistently increasing average wages in manufacturing industry of the fast growing country group from 1965 to 1999.

We obtained interesting results on the labour market regulation-profit share nexus: First, the share of profit in aggregate manufacturing value added is quite lower in high income countries than the other country groups (see Figure IV. 2). Moreover, we observed a decreasing pattern in profit shares till the mid-1980s in this country group. After the mid-1980s, on the other hand, the profit share increased in the high income group. What is interesting is that the increase in profit share turned out to be higher in countries with more regulated labour markets among the high income countries. This outcome, thus, may be related with the fact that regulations in labour markets in the post-1980 period have also profit enhancing aspect along with productivity enhancement with wage compression (decrease in inter-industry wage differentials in manufacturing). The figure also depicts that the share of profit in value added in low income countries is much higher than the high income countries in all periods. Moreover, the profit rate did not fall significantly in the pre-1980 period, but stayed stable. Similar to the high income group, low income countries also showed increasing profit rates in the post-1980 period. When the profit share is compared with respect to the degree of labour market regulation, we found high profit rates in

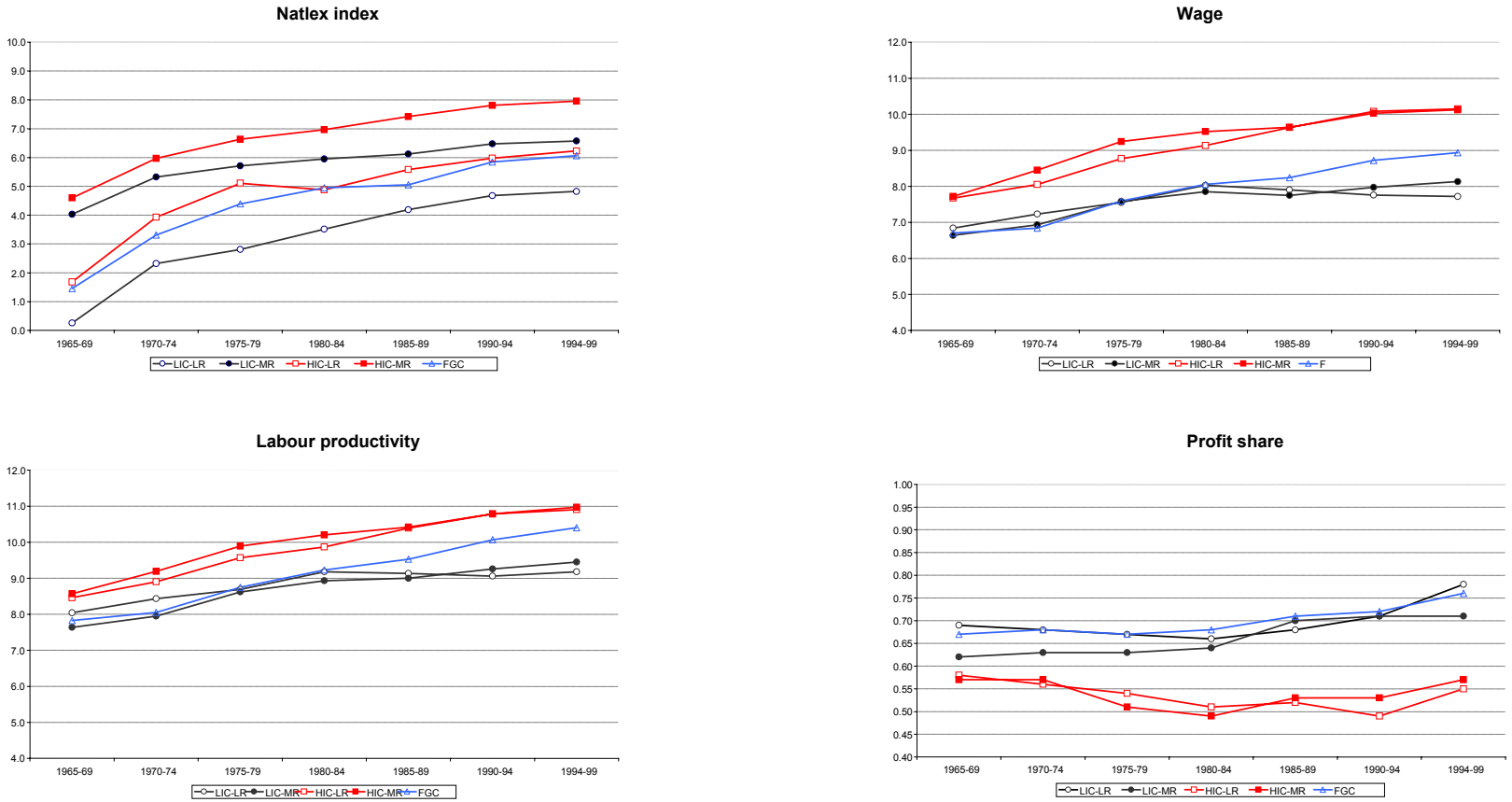
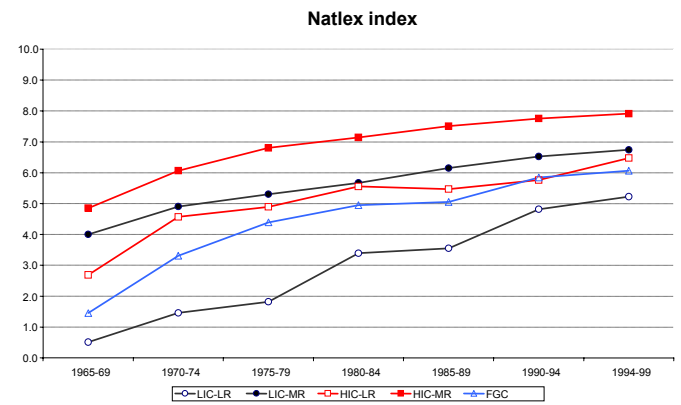
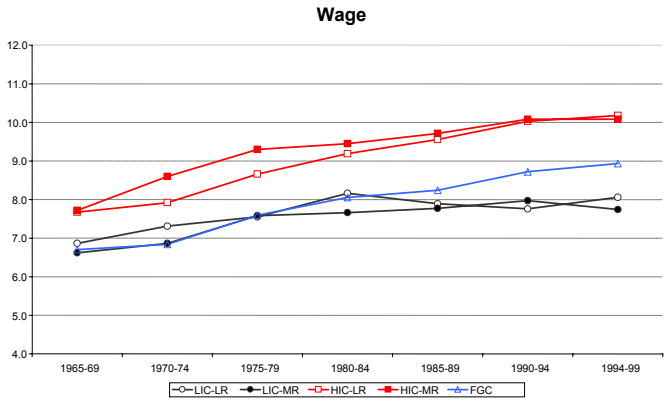
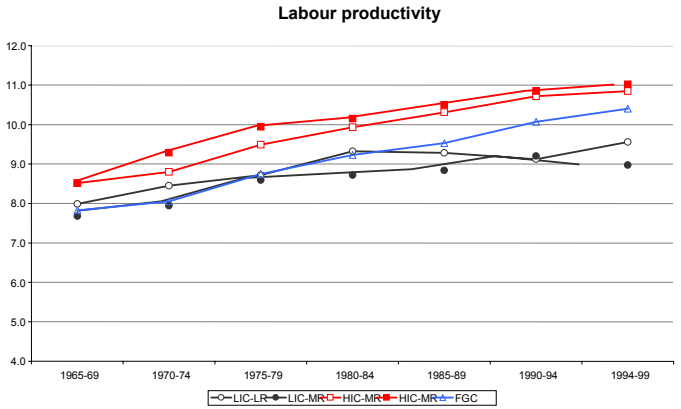


Figure IV. 2. Subject group 1 (conditions of employment, labour administration, and training), 1965-99.
Source: Author calculations based on ILO-Natlex database, 2002.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).
Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.







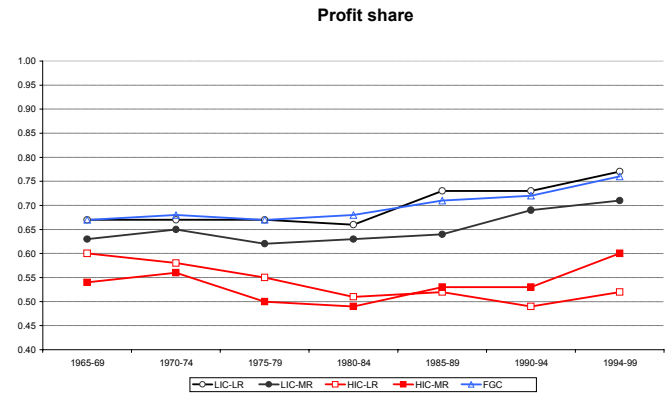
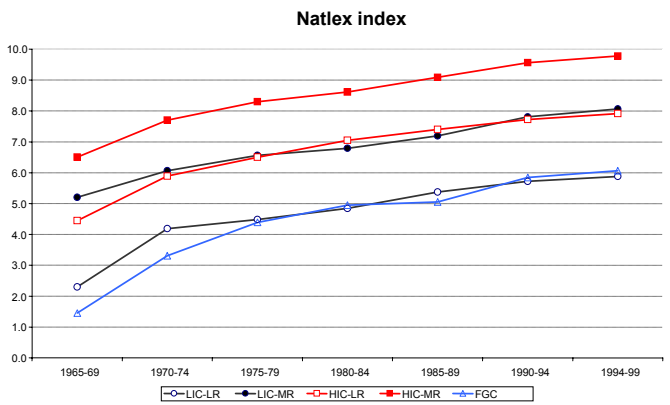
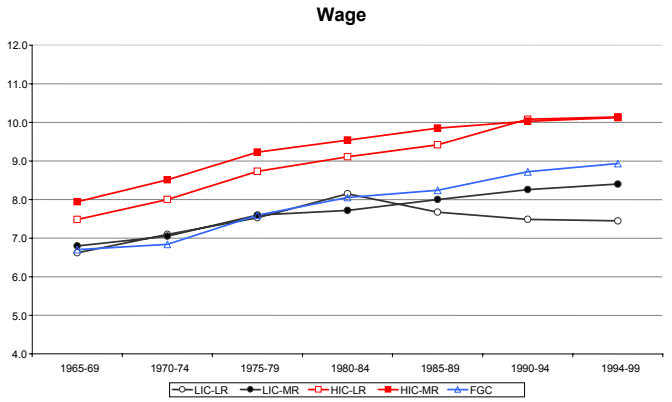
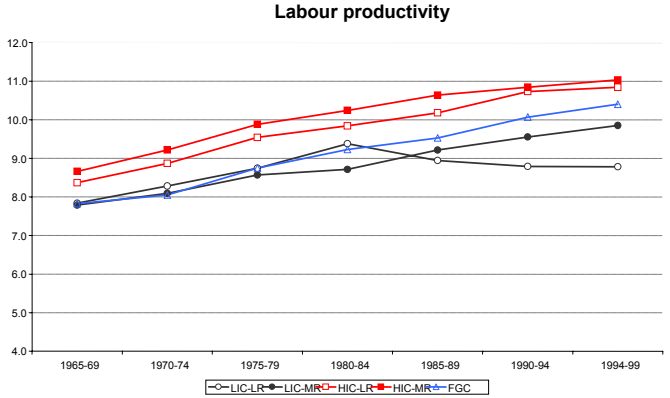


Figure IV. 2 (cont.): Subject group 2 (Conditions of work, economic and social development, and employment)
Source: Author calculations based on ILO-Natlex database, 2002.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).
Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.







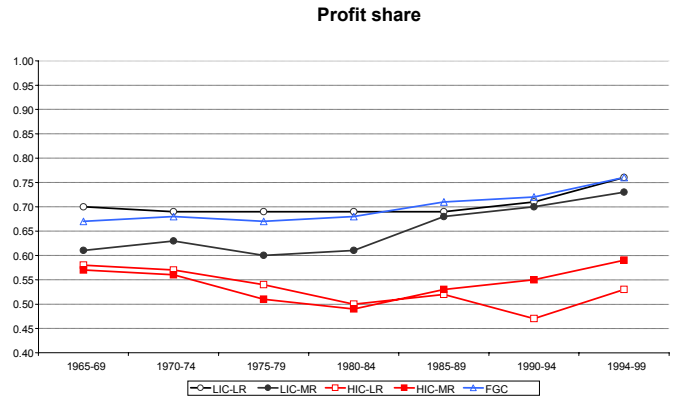
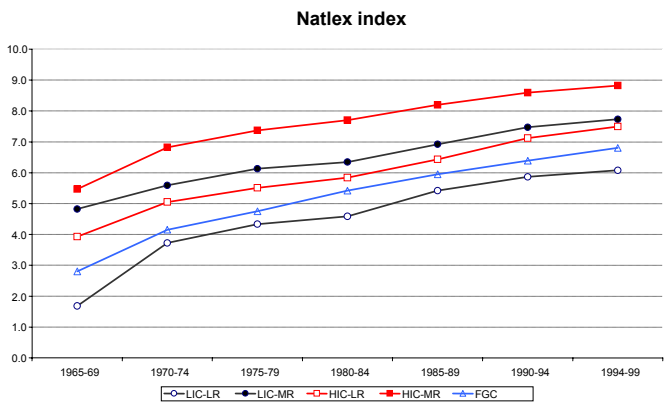
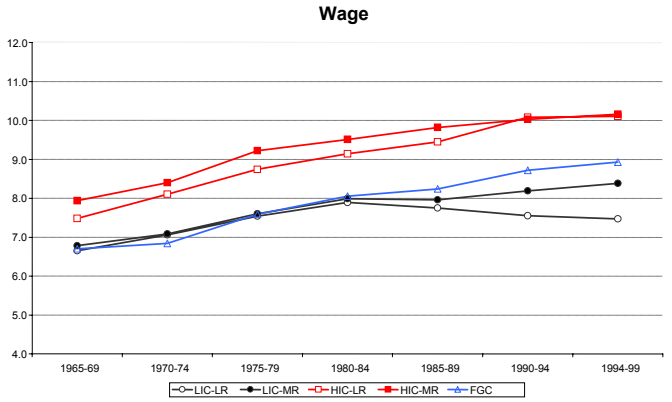
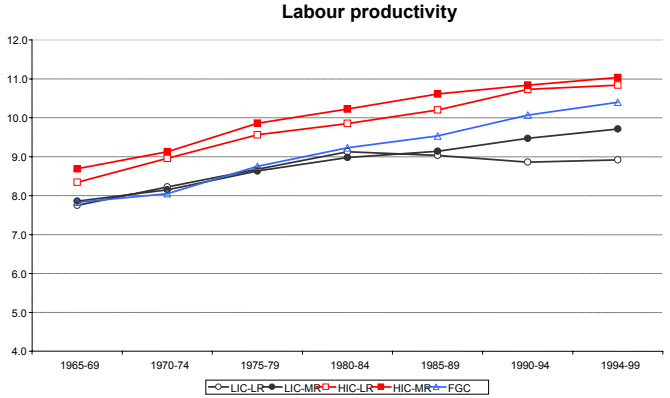


Figure IV. 2 (cont.): Subject group 3 (Human rights, industrial rel., occup. safety and health, social sec., spec. prov. by categ. of persons.)
Source: Author calculations based on ILO-Natlex database, 2002.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).
Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.







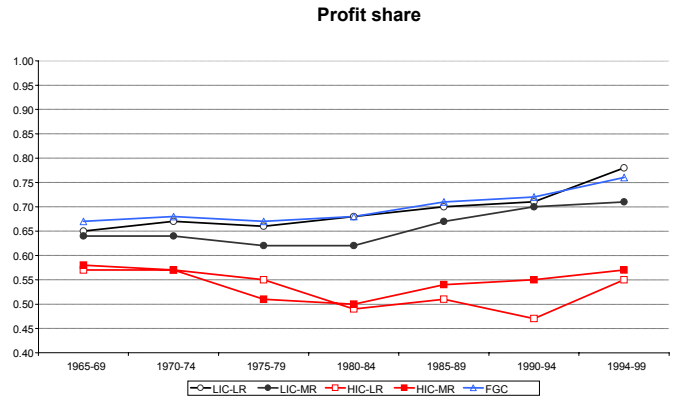


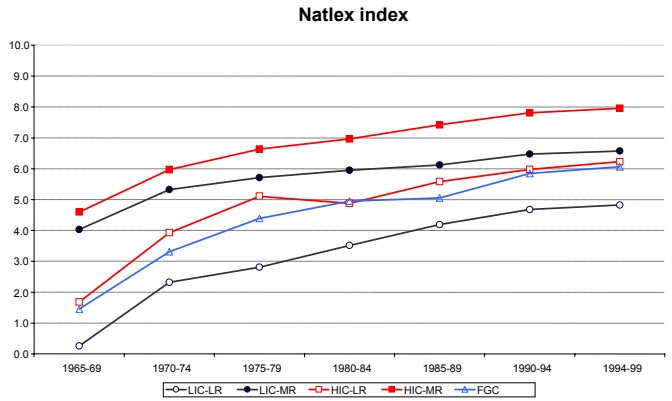
Figure IV. 2 (cont.): Subject group 4 (General provisions, and special provisions by sector of economic activity).
Source: Author calculations based on ILO-Natlex database, 2002.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).
Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.

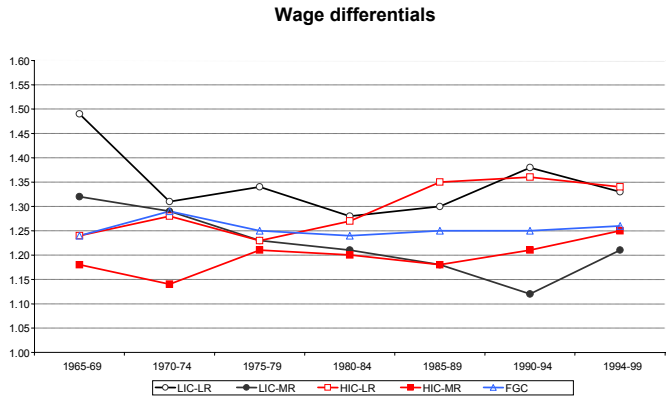
economies with less regulated labour markets in the low income group. Finally, it is not surprising to find the highest ratio of profit share in fast growing countries from 1965 to 1999.

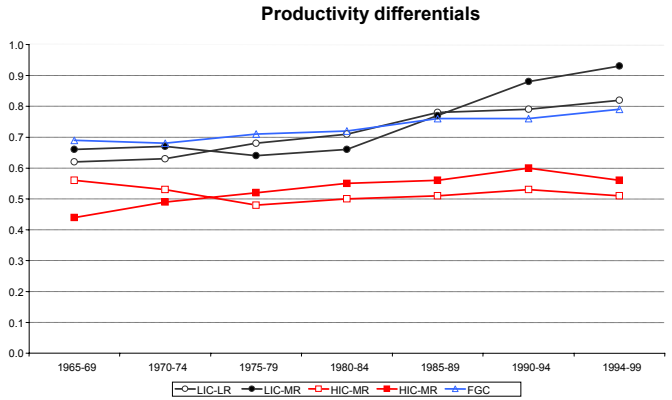
Inter-industry wage differentials, wage flexibility, are perceived as an approximate measure of labour market flexibility/rigidity by labour economics literature. In Figure IV. 3, therefore, we present the findings on the relationship between labour market regulation (Natlex index) and wage differentials in manufacturing industry along with productivity and profit share differentials. We found negative relationship between labour market regulation and the magnitude of wage differentials in manufacturing industries in both high and low income countries (see Figure IV. 3). This seems to suggest that the new regulations in this period may have tended to compress wage differentials (either by lowering high wages or rising low wages).

If the statistics are examined by different country groups, the findings are as follows: In both income groups, wage differentials are higher in countries with less regulated labour markets. In countries with less regulated labour markets, moreover, wage differential increased in both income groups in the post 1980 period. While wage differential is the least in high income countries with more regulated labour markets in the pre-1980 period, it turned to be the low income countries with more regulated labour markets in the post-1980 period. Interestingly, wage differential in the manufacturing industry of fast growing country group has been quite stable between high and low income countries with less and more regulated labour markets during the whole period.

For productivity differentials; Figure IV. 3 reveals that they are much lower in the high income country than the low and fast growing country groups. The figure implies that although there is no strong link between labour market regulation and productivity differential in manufacturing, productivity differentials are slightly higher in high income countries with more regulated labour markets with regard to the subject group 1 and 4 (see Figure IV. 3). The







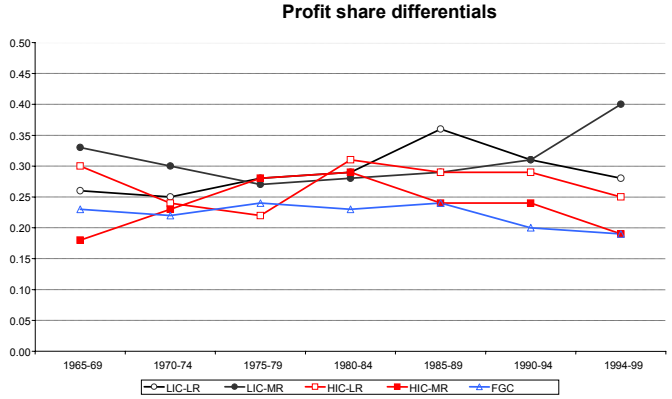
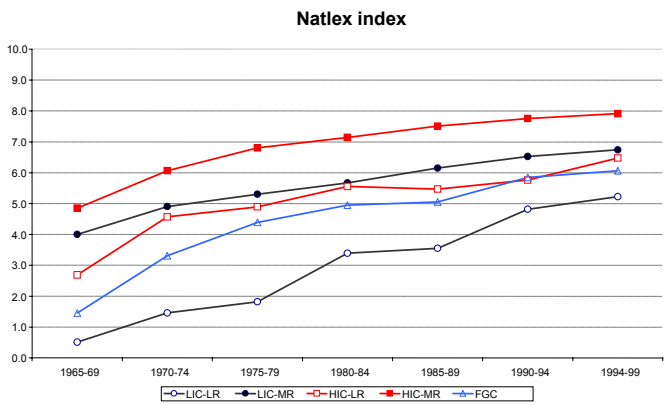
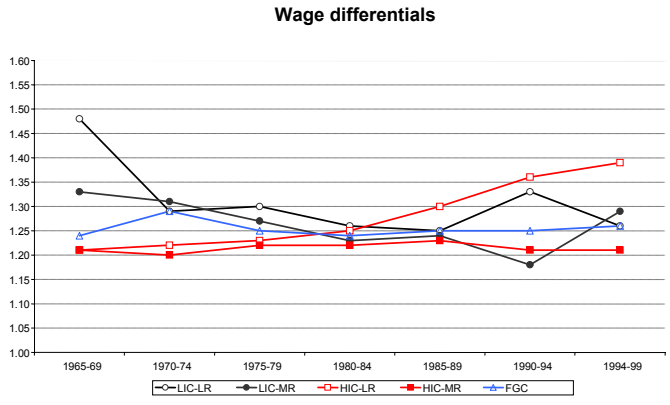
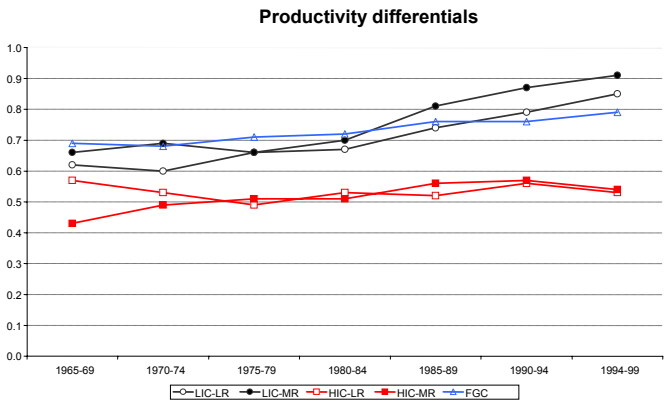


Figure IV. 3. Subject group 1 (conditions of employment, labour administration, and training), 1965-99.
Source: Author calculations based on ILO-Natlex database, 2002.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).
Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.







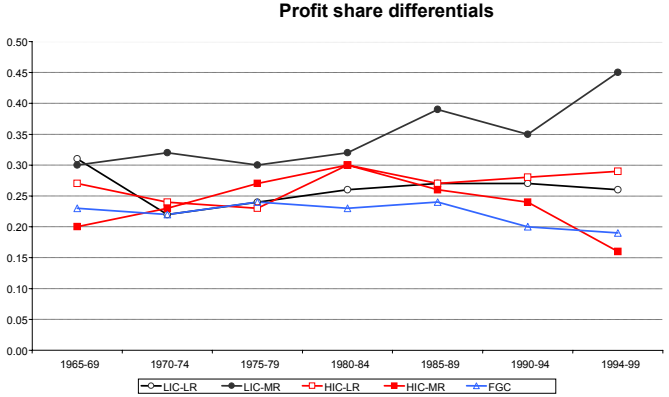
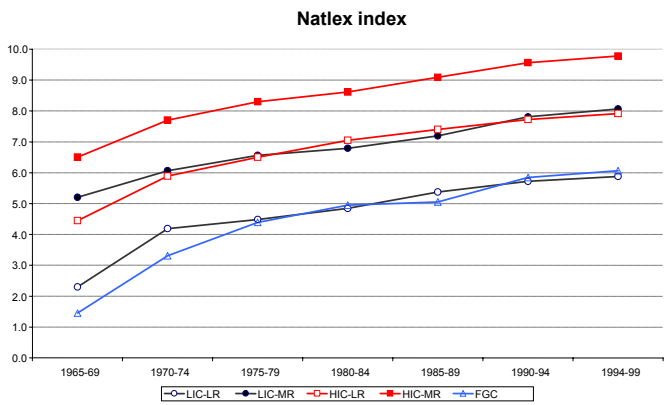
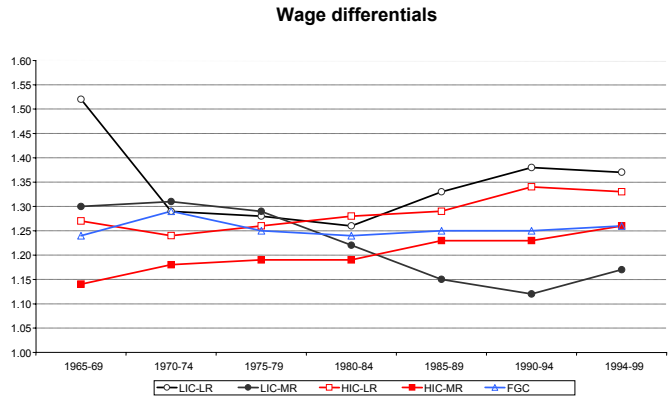
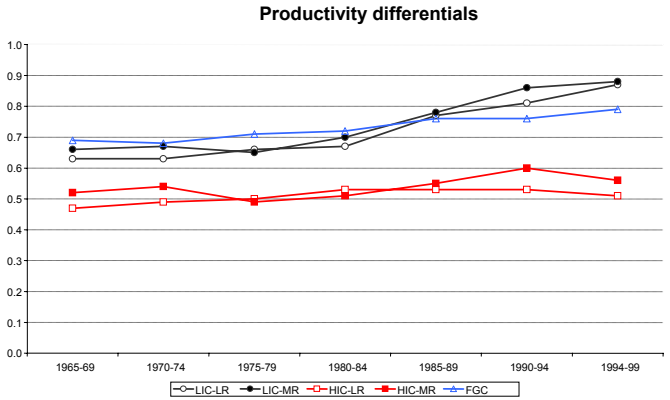


Figure IV. 3 (cont.): Subject group 2 (Conditions of work, economic and social development, and employment)
Source: Author calculations based on ILO-Natlex database, 2002.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).
Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.







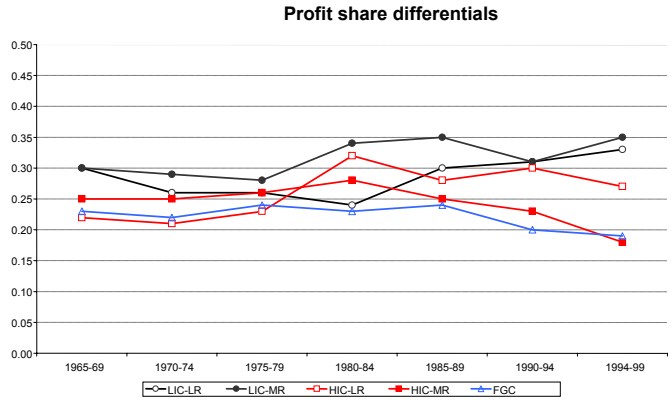
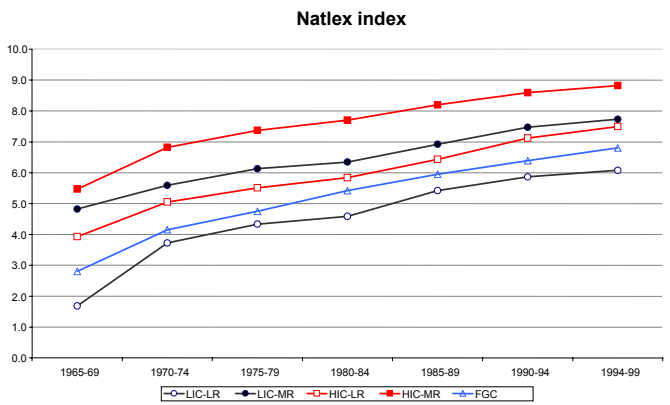
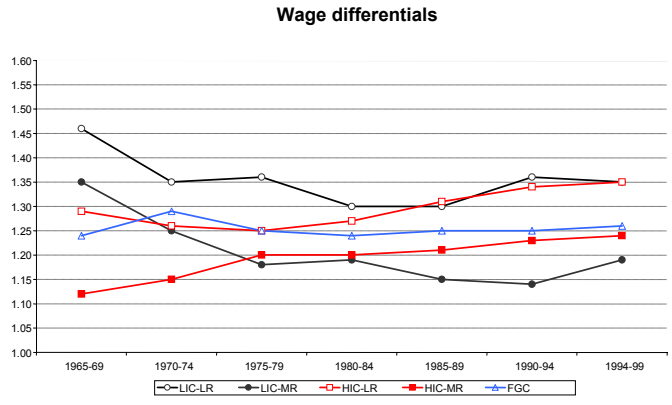
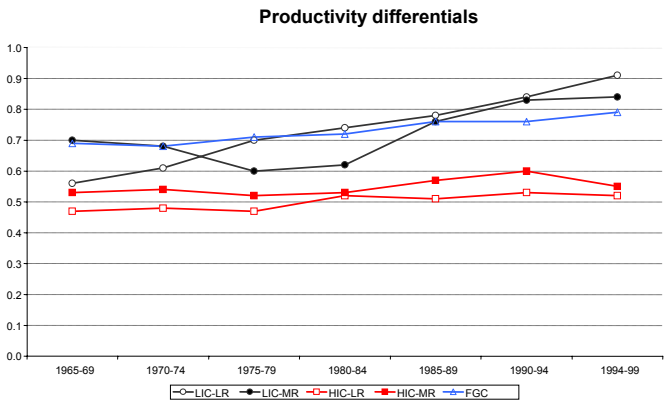


Figure IV. 3 (cont.): Subject group 3 (Human rights, industrial rel., occup. safety and health, social sec., spec. prov. by categ. of persons.)
Source: Author calculations based on ILO-Natlex database, 2002.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).
Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.







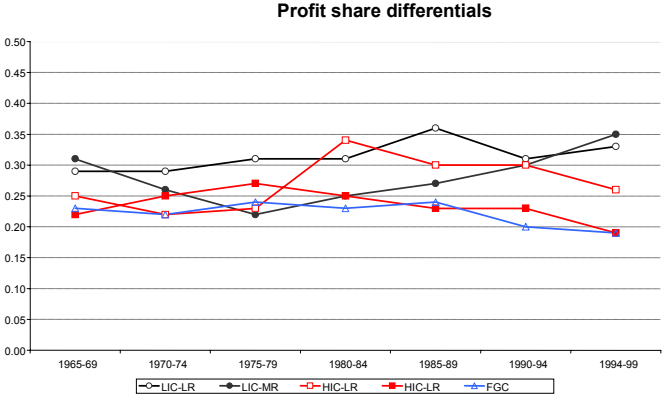


Figure IV. 3 (cont.): Subject group 4 (General provisions, and special provisions by sector of economic activity
Source: Author calculations based on ILO-Natlex database, 2002.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).
Note: LR and MR at the end of country group names stand for "less regulated" and "more regulated" labour markets for each country group.

other finding is that while productivity differential is quite stable in high income countries from 1965 to 1999, we observe an increasing trend in productivity differentials in manufacturing industries of low income countries especially after the 1980s. This seems to suggest the existence of persistent dual economy in low income countries. The record of productivity differentials in the fast growing countries is very similar to those of low income; the increasing trend of 1980s and 1990s is smoother relative to low income countries.

There is nothing much to say about the relationship between labour market regulation and profit share differential in manufacturing industries of the countries under investigation except for the fact of high fluctuations from 1965 to 1999. One result worth mentioning is that the differential in the profit rate in the manufacturing industries of fast growing countries is not only lower than the other country groups for almost all subject group but also it has a falling trend especially in the post-1980 period.

IV. 6. Labour Market Regulation, Industrial Structure and Productivity Growth

The existing industrial and labour market structures may have impact on the performance, measured by labour productivity in manufacturing. Our empirical analysis, thereby, is based on a standard productivity equation augmented to account for the impact of the labour market and industrial structures[4]:

$$LP_{i,t} = \alpha_i + \mu_t + \beta_1 CAPINT_{i,t} + \sum_{j=1}^{7} \delta_j LMI_{j,i,t} + \sum_{k=1}^{3} \psi_k ISI_{k,i,t} + \varepsilon_{it} \qquad \text{(IV.1)}$$

[4] We do not include the other possible source of growth (innovations, capability, R&D supports, and so on.) since those are beyond the scope of this work. We included human capital variable proxied by primary and secondary school enrolment, and youth and adult illiteracy rates in the estimations. But, then, we excluded it from the models basically for two reasons. First, gathered human capital data starts in 1970, leading one period loss. Second, we found no significant relations with labour productivity in all models.

Where LP, CAPINT, LMI, ISI are labour productivity, capital intensity, labour market indicators, and industrial structure indicators respectively. *i and t* denote country and period; and *j* and *k* stands for indicators of labour market and industrial structures, respectively. μ_t and α_i control for time and the unobserved country specific effects. ε_{it} is the usual error term.

In order to account for the speed of adjustment, we also include the lag of labour productivity in equation (IV.1):

$$LP_{i,t} = \alpha_i + \mu_t + \beta_2 LP_{i,t-1} + \beta_1 CAPINT_{i,t} + \sum_{j=1}^{7} \delta_j LMI_{j,i,t} + \sum_{k=1}^{3} \psi_k ISI_{k,i,t} + \varepsilon_{it} \quad \text{(IV.2)}$$

The definition and measurement of the variables used in the estimations are as follows: LP is the labour productivity and measured as value added per employee at constant prices. The first lag of LP in the equation above measures the speed of adjustment, or the so-called "*catch-up*"[5] factor. The coefficient of the lag of labour productivity is expected to be positive and less than one

CAPINT is the capital intensity and measured as the real capital stock[6] per employee.

LMI is used for labour market indicators reflecting both labour market flexibility/rigidity and regulations. There are seven indicators:

WAGEDIFF is the wage differentials in manufacturing industry and measured as the coefficient of variation of logarithm of the average wages in current US dollars. Wage differentials tend to be lower/higher in manufacturing industries of

[5] Note that the "β" in convergence debate is equal to the estimated coefficient of $LP_{i,\ t-1}$,(β_1), minus 1. The null hypothesis in testing for the existence of catch-up, or convergence, then, is Ho: (β_1-1)=β=0.

[6] The capital stock is calculated by perpetual inventory method. Depreciation rate is assumed to be 7.5%.

countries with rigid/flexible labour markets. Thus, while a positive estimated coefficient of the WAGEDIFF variable implies positive impact of labour market flexibility on productivity, a negative and significant estimate of the coefficient shows the negative relation of labour market flexibility with labour productivity.

LAW1 is the log number of laws on subject group 1 (*conditions of employment, labour administration, and training)* enacted in the last 15 years. LAW2, LAW3, and LAW4 are defined in a similar manner with LAW1 for subject group 2 *(conditions of work, economic and social development, and employment)*; subject group 3 (*human rights, industrial relations, occupational safety and health, social security, special provisions by category of persons), and* subject group 4 *(general provisions, and special provisions by sector of economic activity)*. Note that while WAGEDIFF measures the degree of labour market flexibility, LAW1 to LAW4 reflects the degree of regulation in labour markets and does not necessarily imply flexibility or rigidity. In fact, these variables reflect the adaptability of labour markets.

In addition to these labour market structure variables, we used ILO convention index, ILOCNV, of Rama and Artecona (2002) and the labour market flexibility index of the World Bank, WBLMF, to check their impact on productivity growth and compare with our results.

We also included variables representing the structure of manufacturing industry in the light of the findings of previous chapter that industrial structure matter for productivity growth. These are as follows:

ORIENT shows the technological orientation of manufacturing industry and measured as the share of specialised-supplier and science-based industries in aggregate manufacturing value added. A priori, we expect a positive relationship productivity growth and the variable ORIENT.

The second industrial structure variable is the specialisation index, SPI. This variable shows the degree of specialisation and equals to the sum of the squared shares of each manufacturing industry in total manufacturing value added.

SDI, structural differentiation index, reflects the difference of the structure of manufacturing industries of each country from the industrialised country group average. SDI is calculated by summing up the squared difference between each manufacturing industry share from average industry shares of industrialised countries (Club 1 of factor analysis carried out in chapter two).

IV. 6. 1. The summary statistics of the variables

The summary statistics of the variables used in the estimations and their correlations are reported in Tables IV. 1 and 2. The statistics shows that labour productivity, LP, and capital intensity, CAPINT, are lower/higher in low/high income countries than the average (see Table IV. 1).

Among the indicators of the structure of labour markets, we found wage differentials, WAGEDIFF, to be higher in low income countries than high income countries (see Table IV. 1). Average wage differential in fast growing countries is the same as that of low income countries. The correlation between labour productivity and WAGEDIFF found to be negative and quite high. Moreover, correlation analysis confirms the findings of the previous section that there is negative relationship between WAGEDIFF and labour market regulation (LAW1, LAW2, LAW3, and LAW4). Table IV. 1 also implies that high income countries are more regulated than low and fast growing countries. This is confirmed by the ILO convention index, ILOCNV. The relationship between labour market regulation and productivity is found to be positive and significant (see correlations between labour productivity and LAW1-4 and ILOCNV in Table IV. 2). According to the World Bank labour market flexibility index,

Table IV. 1: Summary statistics of the variables, 1965-99.

Variable	Number of Observations				Mean				Std. Dev.			
	AC	LIC	HIC	FGC	AC	LIC	HIC	FGC	AC	LIC	HIC	FGC
LP	311	137	119	55	9.80	9.21	10.57	9.63	0.92	0.74	0.45	0.91
lagLP	306	135	118	53	9.72	9.18	10.46	9.49	0.89	0.73	0.45	0.86
CAPINT	303	131	117	55	10.41	10.10	10.99	9.92	0.96	1.05	0.51	0.87
WAGEDIFF	310	138	117	55	0.04	0.05	0.03	0.05	0.02	0.02	0.01	0.02
LAW1	313	138	119	56	5.04	4.53	5.91	4.44	2.09	2.12	1.81	1.98
LAW2	313	138	119	56	5.09	4.38	5.99	4.94	2.13	2.22	1.85	1.71
LAW3	313	138	119	56	6.59	5.82	7.71	6.16	1.95	2.02	1.53	1.45
LAW4	313	138	119	56	5.92	5.49	6.76	5.18	1.99	2.07	1.62	1.88
ORIENT	306	135	118	53	0.12	0.07	0.17	0.13	0.09	0.05	0.07	0.11
SPI	310	138	117	55	0.09	0.10	0.07	0.09	0.03	0.03	0.01	0.03
SDI	310	138	117	55	0.04	0.05	0.01	0.04	0.03	0.03	0.01	0.02
ILOCNV	273	110	119	44	45.92	40.36	59.74	22.46	27.23	19.35	28.79	17.25
WBLMF	42	19	16	7	50.31	53.79	48.38	45.29	15.36	15.52	14.90	16.05

Source: Author's calculations based on UNIDO-ISDB (2002), NATLEX (2002), Rama and Artecona (2002), WDI (2001), and WB (2003) databases.
Legend: AC (All countries); LIC (Low income countries); MIC (Middle income countries); HIC (High income countries); FGC (Fast growing countries).

Table IV. 2: Pairwise correlations, 1965-99.

Variables	LP	lagLP	CAPINT	WAGEDIFF	LAW1	LAW2	LAW3	LAW4	ORIENT	SPI	SDI	ILOCNV
LP	1											
lagLP	0.97*	1										
CAPINT	0.67*	0.69*	1									
WAGEDIFF	-0.64	-0.59	-0.36	1								
LAW1	0.35*	0.36*	0.26*	-0.25*	1							
LAW2	0.28*	0.29*	0.19*	-0.16*	0.73*	1						
LAW3	0.48*	0.49*	0.27*	-0.37*	0.81*	0.72*	1					
LAW4	0.37*	0.41*	0.23*	-0.22*	0.78*	0.69*	0.87*	1				
ORIENT	0.54*	0.51*	0.32*	-0.52*	0.38*	0.38*	0.44*	0.34*	1			
SPI	-0.31*	-0.28*	-0.13*	0.39*	-0.11	-0.05	-0.21*	-0.08	-0.19*	1		
SDI	-0.49*	-0.46*	-0.22*	0.53*	-0.24	-0.18	-0.34*	-0.19*	-0.53*	0.86*	1	
ILOCNV	0.41*	0.42*	0.45*	-0.34*	0.42*	0.42*	0.48*	0.51*	0.17*	-0.14*	-0.23*	1
WBLMF	-0.28	-0.26	-0.17	0.24	-0.07	0.03	-0.07	-0.11	-0.45	0.06	0.23	0.17

Source: Author's calculations based on UNIDO-ISDB (2002), NATLEX (2002), Rama and Artecona (2002), WDI (2001), and WB (2003) databases.
Note: * significant at 5%.

WBLMF, on the other hand, high income country group turned out to be the country group with labour markets more rigid than low income countries.

ORIENT, the share of specialised supplier and science based industries in aggregate manufacturing value added, is the variable that differs most among the industrial structure indicators with respect to income level (7 and 17% in low and high income countries respectively). Moreover, the variable ORIENT has a strong correlation (0.54) with labour productivity. For SPI, specialisation index, we found that low income countries seem to be more specialised than the other country groups. The reason for such an outcome is that this index shows the overall specialisation in manufacturing industry regardless of the industry structure, especially technological structure of industries[7], since we measure the technological orientations of manufacturing production with ORIENT variable. The explanation of negative correlation of this variable with productivity is inherited in technological structure of manufacturing industry: About half of the sample composed of low income countries and these countries mostly specialised in low technology production which have lower productivity. Similarly, SDI, structural differentiation index, has a negatively correlated with labour productivity: The more difference with the industrialised countries with respect to industrial structure, the lower productivity in manufacturing is.

ILOCNV and WBLMF are consistent on one aspect: the labour markets in fast growing countries are more flexible than both low and high income countries. Table IV.2 shows no significant relationship between productivity and WBLMF index.

[7] A more closer investigation of this index with respect to technology structure of production reveals that while low/high income countries specializes in low/medium, fast growing countries are more specialized in low and high technology production activities.

IV. 6. 2. Estimation methodologies

We use different econometric methodologies in the estimations of the productivity equations since equation (IV. 1) is a *static* productivity equation, while equation (IV. 2) has a *dynamic* nature. Thus, while using *fixed-effects* model in estimation of the equation (IV. 1) leads to consistent estimators of the coefficients of the interest, the same estimation methodology may not give consistent estimators for the dynamic model. Estimation of the dynamic productivity equation, thereby, may require other estimation techniques which lead to more consistent estimators.

For these reasons, the dynamic productivity equation is first estimated by using Ordinary Lest Squares (OLS) with country and time dummies (LSDV) (see Table IV. 5). However, LSDV may not lead to consistent estimators in models with lag dependent variables. In order to remove the possible bias in the LSDV estimators, we use "bias-corrected LSDV" method (LSDV-C) proposed by Bruno (2005) who extends the results of Bun and Kiviet (2003) (see Table IV. 6). Finally, we use one-step GMM estimation method proposed by Arrellano and Bond (1991) (Table IV. 7).

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IV. 6. 3. Estimation results

The estimation results are reported in Tables IV. 3-8. We do not report the results of the estimated models with interaction terms, interactions of industrial structure variables with the indicators of labour markets, since we found no significant impact for interaction variables. In spite of the fact that the estimation results are, to some extent, sensitive to the econometric methodology utilized, the results are plausible and robust.

The findings may be summarized as follows: First, capital intensity, CAPINT, has always been one of the ingredients of productivity in manufacturing from

1965 to 1999. It turned out to be significant and positively related with productivity whatever the econometric mythology is used (see Table IV. 3 to 8). Moreover, estimated long-run elasticity of capital intensity is consistent with economic theory (about 0.4 percent).

We also found that manufacturing productivity in low productivity countries grow faster than that of high productivity countries (positive coefficient of the lagged productivity). In other words, there is a so-called "*catch-up*" process (see Table IV. 5 to 7).

There is a strong, statistically significant, and negative relationship between productivity and wage differential, WAGEDIFF (see Table IV. 3 to 8). This implies that and increase in labour market flexibility, measured by wage differentials, is detrimental to productivity growth.

The relationship between productivity and labour market regulation is sensitive to the estimation technique: while regulations on "*conditions of employment, labour administration, and training",* LAW1, is found to be significant and positively related with productivity in about all models, LAW2 *(conditions of work, economic and social development, and employment),* LAW3 *(human rights, industrial relations, occupational safety and health, social security, special provisions by category of persons),* and LAW4 *(general provisions, and special provisions by sector of economic activity)* turned out to be significant and positively related with productivity only in *static fixed-effects* model (Table IV. 3). In the other models, these labour market regulation indicators (LAW2, LAW3, and LAW4) revealed no significant relationship with productivity in manufacturing. Thus, these variables are not included in the productivity equation in other models.

The results show that structure of manufacturing industry matter for productivity: We found statistically significant positive relationship between productivity growth and ORIENT (see Table IV. 3; models C, D, and E in Table IV. 4 and 6;

Table IV. 3: Determinants of productivity, 1965-99. (fixed-effects model, the dependent variable is the log of labour productivity)

Variables	Model A	Model B	Model C	Model D
CAPINT	0.360***	0.389***	0.367***	0.368***
	[0.036]	[0.036]	[0.036]	[0.036]
WAGEDIFF	-5.331***	-6.704***	-5.082***	-5.280***
	[1.625]	[1.652]	[1.631]	[1.634]
LAW1	0.059***			
	[0.010]			
LAW2		0.055***		
		[0.010]		
LAW3			0.074***	
			[0.013]	
LAW4				0.063***
				[0.012]
ORIENT	0.886**	0.890**	0.829**	0.880**
	[0.398]	[0.405]	[0.404]	[0.403]
Observations	293	293	293	293
Number of Countries	44	44	44	44
R^2(within)	0.514	0.505	0.512	0.509
F-Stat	64.579	62.356	63.944	63.189
F-Stat(u_i)=0	27.078	26.488	25.215	25.624

Notes: Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table IV. 4 : Determinants of productivity growth, 1965-99. (fixed-effects model, the dependent variable is the log of labour productivity)

Variables	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model H	Model I
CAPINT	0.447***	0.386***	0.386***	0.360***	0.341***	0.450***	0.455***	0.390***	0.391***
	[0.036]	[0.034]	[0.038]	[0.036]	[0.036]	[0.035]	[0.036]	[0.034]	[0.034]
WAGEDIFF	-7.608***	-6.277***	-5.594***	-5.331***		-7.891***	-8.168***	-6.516***	-6.571***
	[1.693]	[1.564]	[1.726]	[1.625]		[1.677]	[1.708]	[1.562]	[1.594]
LAW1		0.067***		0.059***	0.061***			0.065***	0.066***
		[0.010]		[0.010]	[0.010]			[0.010]	[0.010]
ORIENT			1.673***	0.886*	1.227***				
			[0.397]	[0.398]	[0.389]				
SPI						2.683**		1.783*	
						[1.037]		[0.967]	
SDI							2.265*		1.063
							[1.175]		[1.099]
Observations	293	293	293	293	293	293	293	293	293
Number of countries	44	44	44	44	44	44	44	44	44
R^2(within)	0.413	0.508	0.449	0.514	0.496	0.428	0.421	0.514	0.51
F-Stat	86.714	84.572	66.63	64.579	80.945	61.372	59.682	64.896	63.646
F-Stat(u_i)=0	24.229	28.967	23.539	27.078	33.742	24.547	22.275	28.918	26.671

Notes: Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table IV. 5: Determinants of productivity, 1965-99. (dynamic LSDV model, the dependent variable is the log of labour productivity)

Variables	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model H	Model I
LP_{t-1}	0.667***	0.660***	0.668***	0.661***	0.684***	0.669***	0.661***	0.669***	0.662***
	[0.094]	[0.095]	[0.091]	[0.092]	[0.089]	[0.095]	[0.095]	[0.096]	[0.097]
CAPINT	0.147***	0.143***	0.127***	0.123***	0.106*	0.148***	0.145***	0.149***	0.145***
	[0.045]	[0.044]	[0.048]	[0.047]	[0.044]	[0.045]	[0.044]	[0.044]	[0.043]
WAGEDIFF	-3.748***	-3.787***	-3.129**	-3.157*		-3.836***	-3.889***	-3.852***	-3.903***
	[1.335]	[1.332]	[1.410]	[1.405]		[1.311]	[1.302]	[1.297]	[1.287]
LAW1		0.018*		0.019*	0.018*		0.019*		0.018*
		[0.009]		[0.009]	[0.009]		[0.009]		[0.009]
ORIENT			0.531	0.547	0.744*				
			[0.369]	[0.367]	[0.329]				
SPI						0.877	0.986		
						[0.866]	[0.852]		
SDI								0.447	0.494
								[0.993]	[0.974]
Observations	287	287	287	287	287	287	287	287	287
Number of countries	44	44	44	44	44	44	44	44	44
R^2	0.966	0.967	0.967	0.967	0.966	0.967	0.967	0.966	0.967
Adj R^2	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959
F-Stat	328.565	343.151	323.617	364.124	387.692	307.966	312.785	314.053	323.867

Notes: Robust standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table IV. 6: Determinants of productivity, 1965-99. (dynamic LSDV-C model, the dependent variable is the log of labour productivity)

Variables	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model H	Model I
LP	0.879***	0.864***	0.883***	0.867***	0.891***	0.879***	0.879***	0.862***	0.863***
	[0.065]	[0.067]	[0.057]	[0.058]	[0.067]	[0.065]	[0.064]	[0.067]	[0.066]
CAPINT	0.085***	0.085***	0.065**	0.064**	0.052	0.088***	0.090***	0.088***	0.089***
	[0.028]	[0.028]	[0.032]	[0.033]	[0.033]	[0.027]	[0.027]	[0.027]	[0.027]
WAGEDIFF	-3.097**	-3.166**	-2.489**	-2.542**		-3.189**	-3.288**	-3.265**	-3.353**
	[1.440]	[1.441]	[1.179]	[1.179]		[1.461]	[1.499]	[1.462]	[1.501]
LAW1		0.013		0.014	0.014			0.015	0.014
		[0.013]		[0.011]	[0.015]			[0.013]	[0.013]
ORIENT			0.578*	0.593**	0.738**				
			[0.299]	[0.301]	[0.325]				
SPI						0.998		1.051	
						[0.803]		[0.792]	
SDI							0.768		0.751
							[0.883]		[0.882]
Observations	287	287	287	287	287	287	287	287	287
Number of countries	44	44	44	44	44	44	44	44	44

Notes: Bootstrapped standard errors in brackets. The bootstrap variance-covariance matrix for LSDVC is calculated by 50 repetitions.
* significant at 10%; ** significant at 5%; *** significant at 1%
Regression includes time dummies.
Bias correction initialized by Arellano and Bond estimator. Bias correction order is 3.

Table IV. 7: Determinants of productivity, 1965-99. (GMM model, the dependent variable is the log of labour productivity)

Variables	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model H	Model I
LP	0.731***	0.693***	0.732***	0.693***	0.720***	0.722***	0.715***	0.683***	0.677***
	[0.106]	[0.107]	[0.107]	[0.107]	[0.109]	[0.106]	[0.105]	[0.106]	[0.105]
CAPINT	0.075*	0.079*	0.082*	0.086*	0.067	0.081*	0.083*	0.085*	0.087*
	[0.044]	[0.043]	[0.046]	[0.046]	[0.046]	[0.044]	[0.044]	[0.043]	[0.043]
WAGEDIFF	-4.240***	-4.476***	-4.410***	-4.645***		-4.401***	-4.503***	-4.653***	-4.760***
	[1.553]	[1.532]	[1.591]	[1.570]		[1.562]	[1.571]	[1.542]	[1.551]
LAW1		0.026*		0.026*	0.023			0.027*	0.027*
		[0.014]		[0.014]	[0.014]			[0.014]	[0.014]
ORIENT			-0.285	-0.284	-0.067				
			[0.488]	[0.482]	[0.481]				
SPI						0.694		0.786	
						[1.068]		[1.055]	
SDI							0.669		0.777
							[1.061]		[1.048]
Observations	243	243	243	243	243	243	243	243	243
Number of countries	44	44	44	44	44	44	44	44	44
F-Stat	13.533	12.851	12.096	11.633	11.483	12.081	12.11	11.635	11.669
Sargan	48.702	47.466	48.534	47.316	47.083	48.94	49.296	47.454	47.711
A-B1	-2.675	-2.527	-2.640	-2.488	-2.666	-2.723	-2.715	-2.579	-2.566
A-B2	-2.080	-2.110	-2.000	-2.020	-1.670	-2.100	-2.090	-2.140	-2.120

Notes: Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
Regression includes time dummies.
Sargan: Sargan test of over-identifying restrictions.
A-B1: Arellano-Bond test that average autocovariance in residuals of order 1 is 0.
A-B2: Arellano-Bond test that average autocovariance in residuals of order 2 is 0.

Table IV. 8: Determinants of productivity, 1965-99. (the dependent variable is the log of labour productivity)

Variables	Model A	Model B	Model C	Model D	Model E	Model F	Model G
CAPINT	0.404***	0.355***	0.370***	0.340***	0.290***	0.285***	0.250*
	[0.040]	[0.041]	[0.039]	[0.040]	[0.100]	[0.095]	[0.104]
WAGEDIFF	-5.558***	-3.408*	-5.080***	-3.637*	-34.070***	-30.563***	-31.221***
	[2.018]	[2.051]	[1.929]	[1.989]	[5.200]	[5.182]	[5.710]
LAW1			0.067***	0.056***		0.199**	
			[0.015]	[0.015]		[0.089]	
ORIENT		1.639***		1.157**			1.504
		[0.456]		[0.460]			[1.074]
ILOCNV	0.010***	0.008***	0.004*	0.004			
	[0.002]	[0.002]	[0.002]	[0.002]			
WBLMF					-0.006	-0.006	-0.003
					[0.007]	[0.006]	[0.008]
Observations	252	252	252	252	40	40	40
Number of countries	44	44	44	44	40	40	40
R^2	0.458	0.491	0.509	0.524	0.691	0.729	0.707
Adj R^2	0.337	0.373	0.396	0.411	0.666	0.699	0.672
F-Stat	57.837	49.122	52.896	44.684	26.866	23.597	20.471
F-Stat(u_i)=0	24.471	23.43	26.3	25.027			

Notes: Standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
Model A, B, C, and D are fixed-effects model. Model E, F, and G are the models based on cross-sectional data for the last period (1995-99)

model E in Table IV. 5; model B and D in Table IV. 8). This implies that labour productivity is higher in a country specialized in specialized-supplier and science-based industries. GMM estimation results for the dynamic model reported in Table IV. 7 do not support the results of the other models on the ORIENT variable i.e., it is not only insignificant but also has negative signs. This may be due to the fact that in this estimation method predetermined and endogenous variables in first differences are instrumented with suitable lags of their own levels. However, lagged levels are often poor instruments for first differences (Blundell and Bond, 1998:115-116). Thus, the estimation results may be poor in explaining the relations.

Among the other two industrial structure variables, specialization (SPI) turned out to be significant and positively related with productivity only in *static fixed-effects* model (see model F and H in Table IV. 4). In dynamic productivity equations, however, no significant relationship between SPI and productivity emerged.

Similarly, structural differentiation (SDI), found to be significant only in *static fixed-effects* model (see model G in Table IV. 4) but in dynamic models. So either this index is a poor indicator of industrial structure, or it has no impact on performance.

We also estimated the productivity growth model by utilizing other labour market flexibility/rigidity indicators, namely ILOCNV, ILO convention index of Rama and Artecona (2002), and WBLMF, labour market flexibility index of the World Bank (2003) (see Table IV. 8). The findings are as follows: contrary to the results of Calderon and Chong (2005), we found significant relationship between productivity and labour market rigidity, as measured by ILOCNV (see model A, B, and C in Table IV. 8). For the labour market flexibility index of the World Bank, WBLMF, on the other hand, no statistically significant partial correlation is observed in three of estimated models based on the cross-sectional data (see model A, F, and G in Table IV. 8).

IV. 7. Summary

This chapter has analyzed the impact of the industrial and labour market structures on productivity in manufacturing. In order to do so, we first developed a new labour market regulation index based on the legislation regulating labour markets. We argued that this new index reflects the degree of regulation. If there is anything fostering flexibility in work relations inherent in these regulations that should be functional flexibility which has a positive association with performance, labour productivity growth. In other words, regulations lead to increased rigidity and/or adaptability in labour markets but not pure numerical or wage flexibility. We measured the degree of labour market flexibility, in addition, with inter-industry wage differentials (wage flexibility).

We found a negative relationship between labour market regulation and wage flexibility. In other words, increased labour market regulation tends to be associated with lower wage flexibility. The estimation results also showed that while wage flexibility is detrimental to productivity growth in manufacturing, regulations may foster productivity growth. Especially, *de jure* regulations on the areas of *conditions of employment, labour administration, and training* may bring about positive consequences for productivity.

This chapter has also showed the significance of industrial structure on economic performance: higher share of specialised supplier and science based industries in total manufacturing production leads to higher labour productivity in manufacturing industry.

CHAPTER V

CONCLUSION AND POLICY IMPLICATIONS

V. 1. Introduction

This dissertation provides evidence on the inter-relationship between industrial structure, productivity growth, labour market structure and industrial performance for about 50 countries with different characteristics from 1965 to 1999. The lessons to be taken forth from this study especially for under developed countries may be summarized as follows:

- Industrialisation and development requires an established manufacturing industry base.
- Meanwhile, the diversification of both production and exports of manufacturing industry may foster further industrialisation.

- The transformation of both industrial production and exports towards more progressive industries (industries with more technology, science and skill intensity) may help industrialisation process by enhancing productivity and competitiveness.
- Flexible labour markets do not necessarily bring about productivity increases. On the contrary, "rigid" and adaptable labour markets matter more for productivity growth in manufacturing.

V. 2. Main Findings

In chapter 2, we found that specialised supplier and science based industries recorded the highest growth rates in production, productivity and trade from 1965 to 1999. Accordingly, the growth performance of manufacturing industry of fast growing countries has been outstanding. The results also imply that industrial structure with respect to both manufacturing production and trade matters also for performance: we found that in path of industrialisation, the structure of manufacturing industry changes radically i.e., industrialisation is accompanied by a sharp decline in the share of labour and resource intensive industries in total manufacturing production and trade on the one hand, and an increase in the share of specialised supplier industries on the other.

We found evidence of positive effect of structural change on productivity growth in a very limited number of countries (Indonesia, Ireland, Jordan, Malta, Iran, and Singapore from 1965 to 1999). In the manufacturing industry of industrialised countries, on the other hand, structural change did not contribute to aggregate productivity growth in manufacturing (Unites States, Japan, Germany, France, Spain, and so on). It is also worth mentioning that Korean manufacturing industry, which has the highest productivity growth in manufacturing from 1965 to 1999, has not benefited from structural change.

Positive effect of structural change on productivity growth is observed in Turkish manufacturing industry in the pre-1980 period, and it turned out to be negative in the post-1980 period. We believe that is the outcome of the liberalisation efforts of 1980s.

Structural change seems to have an insignificant impact on overall growth in labour productivity because industrially successful countries achieve higher productivity growth across all industries, i.e., the *within-effect* dominates the *between-effect*. This may suggest that industrialisation process may first require diversified production structure in manufacturing. Subsequently, concentration of production in scale intensive and specialised supplier industries may help in further industrialisation and growth.

Negligible impact of structural change on productivity growth may be due to following reasons: first, high rates of domestic capital accumulation, technological advancement, human capital, and other factors may at least be as important as improving the allocation of resources among sectors for productivity increase. Second, structural change may be occurring at lower levels of disaggregation (i.e., at the firm level) that cannot be captured in the analysis based on the three digit ISIC level manufacturing data. Third, decomposition analysis does not take the spillover and externality effects into account, i.e., increase in productivity and/or demand in one industry of manufacturing may positively leads to productivity and/or output increase in another industry.

Examination of manufacturing industry of countries with respect to their technology intensity in Chapter 3 showed the existence of strong correlation between technological structure with respect to manufacturing production and exports and industrial performance. While less developed countries have an industrial structure composed mainly of low technology industries, medium and high technology industries have higher shares in industrial production in developed countries. More importantly, the countries with high growth performance in this period have more dynamic industrial structure in favour of

progressive industries (Ireland, Korea, Malaysia, Malta and Singapore). They, thereby, were able to shift their industrial structure radically towards more technology intensive production and exports. It is interesting to observe that, as a fast growing country (in terms of growth in manufacturing value added), Turkey has not experienced such a progress.

The results of factor analysis provided additional evidence on the evolution of industrial structure and its relation with industrial development. The findings suggest that there is no evidence of strong convergence with regard to industrial structure. On the contrary, our analysis showed the existence of three different clubs with respect to the countries' production and trade structure which is consistent with the development stages of countries. While one of these clubs is composed of less developed countries in a given time period, the other turned out to be a club mostly formed by industrialised countries. The countries managed to move into the club of developed countries out of the other clubs were the countries performing high growth rates like Korea, Ireland, Malaysia, and Singapore.

The findings, hence, may seem to suggest that there is an international division of labour with respect to industrial production and trade. On the other hand, we found that while less developed countries specialise in low technology, low skill, labour and/or resource intensive industrial activities, developed countries maintain their diversified industrial composition with specialisation in more technology and skill intensive production and exports. We also observe a gradual change in industrial structures of developed (industrialised) and less developed (less industrialised) countries since the late 1960s.

Econometric estimation results in Chapter 4, provides evidence on the importance of industrial structure on economic performance: higher share of specialised supplier and science based industries in total manufacturing production leads to higher labour productivity in manufacturing

The previous chapter's findings suggest increased labour market regulation tends to be associated with lower wage flexibility, measured as inter-industry wage differentials. The estimation results showed that while wage flexibility is detrimental to productivity growth in manufacturing, regulations may foster productivity growth. Especially, *de jure* regulations on the areas of *conditions of employment, labour administration, and training* may bring about positive consequences for productivity.

III. Policy Implications

This study reached three main conclusions to derive policy implications. First, most countries have not experienced structural change in their manufacturing sector leading important overall productivity increases. Industrially successful countries, on the other hand, achieved higher productivity growth across all sectors. This finding implies that for a sustainable and high industrial growth, less developed countries need a well-established and diversified manufacturing industry. In order to establish such a manufacturing industry, a country in the path of industrialisation, first, should have a consistent and long term national industrial development strategy with well-targeted micro policies. Saving and investment rates should be high enough to enable further production/productivity increases since development literature always stresses the close relationship between high rates of investment and productivity/production increases. Furthermore, productivity growth not only depends on investment but also on how investment combined with learning in the context of technological progress. Since technological progress is a joint outcome of investment in capital and learning how to use it efficiently. Therefore less developed countries need to enlarge their knowledge base by investing more in education, training and innovativeness.

Policies targeted to enhance industrial base and competitiveness from a macro perspective may be as important as the micro ones especially for the least

developed countries without an industrial base. However, high and sustainable growth in income in the long run requires the establishment of a strong and dynamic industrial base (UNCTAD, 2003: 93). Therefore, the governments in such countries should work for the development of an industrial base at first. Countries like Turkey in which there are already existing manufacturing industries with low technology and skill orientations, policies should be directed to enhance more technology and skill intensive production to attain a diversified production and export structure and competitiveness in international markets.

Secondly, we found that industrial structure of countries differ substantially with respect to their development stage: While developed countries have more technology intensive production and exports structures, less developed countries have an industrial structure mostly depending on low technology and skill. We showed that only the high performing countries like Korea, Malaysia, Ireland, and Malta succeed in transforming their industrial structure. This implies that industrial development process requires a radical change in industrial structure. From this perspective, we can suggest incremental and selective industrial support programs including financial (venture capital, etc.) and non-financial support (training, etc.) to help the establishment of a manufacturing sector directed through a more technology and skill intensive industrial production. This, however, comes with many problems: First, this is not one-for-all policy tool since countries have different assets and capabilities. Second, it is not an easy task to determine which industry to support. Even in the case of successful determination of progressive industries, not all firms in such industries are required to be supported. Therefore, implementation of support programs should be carried out with a great care. In line with this, removal of industrial support in mature industries or firms may be another policy option as proposed by OECD (2002).

Finally, we found that the structure of labour markets is important for economic performance. Flexibility in labour markets does not necessarily lead to higher employment and output. We found, on the contrary, more regulated labour

markets are associated with productivity growth in the long run. Policies regulating the labour markets, therefore, should not aim at increasing flexibility in labour markets but increasing rigidity/adaptability of labour markets in order to create intensives for both employees and employers for productivity and efficiency enhancing by training, and skill upgrading.

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APPENDIX A: CLASSIFICATION OF MANUFACTURING INDUSTRIES

ISIC	Industry	Technology	Orientation
311	Food	LT	RI
313	Beverages	LT	RI
314	Tobacco	LT	RI
321	Textiles	LT	LI
322	Wearing Apparel	LT	LI
323	Leather & Products	LT	LI
324	Footwear	LT	LI
331	Wood Products	LT	SI
332	Furniture & Fixtures	LT	SI
341	Paper & Products	LT	RI
342	Printing & Publishing	LT	RI
351	Industrial Chemicals	MT	SI
3522	Drugs & Medicine	HT	SB
352X	Chemical Products, nec	MT	SI
353	Petroleum Refineries	LT	RI
354	Petroleum & Coal Products	LT	RI
355	Rubber Products	MT	SI
356	Plastic Products	MT	SI
361	Pottery, China etc.	LT	RI
362	Glass & Products	LT	RI
369	Non-Metallic Products, nec	LT	RI
371	Iron & Steel	LT	SI
372	Non-Ferrous Metal	MT	RI
381	Metal Products	LT	LI
3825	Office & Computing Machinery	HT	SB
382X	Machinery & Equipment, nec	MT	SS
3832	Radio, TV & Communication Eqpt.	HT	SS
383X	Electrical Machinery, nec	HT	SS
3841	Ship Building	MT	SI
3843	Motor Vehicles	MT	SI
3845	Aerospace	HT	SB
384X	Transport Eqpt., nec	MT	SI
385	Professional goods	HT	SB
390	Other Manufacturing	MT	LI

Source: OECD, 1992.

Legend: HT: high-technology; MT: medium-technology; LT: low-technology.
RI: resource-intensive; LI: labour-intensive; SI: scale-intensive; SS: specialised-supplier; SB: science-based.

APPENDIX B:
COUNTRIES IN THE SAMPLE

Country Name	Income Level
Austria	HIC
Bolivia	MIC
Canada	HIC
Chile	MIC
China	MIC
Colombia	MIC
Costa Rica	MIC
Cyprus	HIC
Ecuador	MIC
Egypt, Arab Rep.	MIC
Ethiopia	LIC
Finland	HIC
France	HIC
Germany	HIC
Greece	HIC
Honduras	MIC
Hungary	MIC
Iceland	HIC
India	LIC
Indonesia*	LIC
Iran, Islamic Rep.	MIC
Ireland*	HIC
Israel	HIC
Italy	HIC
Japan	HIC
Jordan	MIC
Kenya	LIC
Korea, Rep. *	MIC
Kuwait	HIC
Malaysia*	MIC
Malta*	HIC
Mauritius	MIC
Mexico	MIC
Morocco	MIC
Netherlands	HIC
Norway	HIC
Pakistan	LIC
Panama	MIC
Philippines*	MIC
Portugal	HIC

Note: * Fast growing country with respect to manufacturing value added growth.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries).

APPENDIX B (CONT.): COUNTRIES IN THE SAMPLE

Country Name	Income Level
Singapore*	HIC
South Africa	MIC
Spain	HIC
Sri Lanka	MIC
Sweden	HIC
Tanzania	LIC
Tunisia	MIC
Turkey*	MIC
United Kingdom	HIC
United States	HIC
Uruguay	MIC
Venezuela, RB	MIC

Note: * Fast growing country with respect to manufacturing value added growth.
Legend: LIC (Low income countries); MIC (Middle income countries); HIC (High income countries).

APPENDIX C: TURKISH SUMMARY

ENDÜSTRİYEL YAPI VE İŞGÜCÜ PİYASALARI: VERİMLİLİK ARTIŞI ÜZERİNE BİR İNCELEME

I. Giriş

Bu çalışmayı motive eden temel araştırma sorusu şudur: Ülkeler arası büyüme oranları neden farklıdır? Ülkeler arası büyüme farklılıkların arkasında birçok neden olabilir. Fakat *"verimlilik"* her zaman büyüme farklılıklarının nedenlerini araştıran çalışmaların ve tartışmaların merkezinde olmuştur. Bu yüzden, bu tez verimlilik ile ölçülen ekonomik performans ile endüstriyel yapı ve işgücü piyasaları arasında bir ilişki olup olmadığını araştırmaktadır. Bu ilişkileri açıklayabilmek için, şu sorulara cevap aranmaktadır:

1. İmalat sanayii üretim ve ticaretinin yapısı ile economic performans arasında bir ilişki olabilir mi?
2. İmalat sanayiindeki yapısal degişimin verimlilik artışına bir katkısı var mıdır?

3. Üretim ve ticaretin teknolojik yapısının endüstrileşme yolunda bir önemi var mıdır?
4. Endüstriyel yapılarda ülkeler arası bir yakınsama mı vardır, yoksa bir çeşit uluslararsı işbölümü mü söz konusudur?
5. Son olarak, işgücü piyasalarının yapısı, verimlilik için bir önem arz etmektemidir?

Bu çalışmanın planı kısaca şöyle özetlenebilir: İkinci bölüm, ülkelerin endüstriyel yapılarının teknolojik yönelimlerini betimsel olarak inceledikten sonra, imalat sanayii verimlilik artışında yapısal değişikliğin etkisini araştırmaktadır. Bölüm 3 ülkelerin imalat sanayii üretim ve ticaretinin teknolojik yapılarının zaman içerisindeki gelişimini inceledikten sonra, endüstriyel yapılarda ülkeler arası bir benzeşme eğiliminin olup olmadığını araştırmaktadır. Dördüncü bölümde ise, öncelikle yeni bir işgücü piyasası düzenleme endeksi oluşturulup, daha sonra işgücü piyasaları ve imalat sanayii yapılarının verimililiğe etkisi araştırılmaktadır. Çalışmanın sonuçları ve politika önermeleri son bölümde yer almaktadır.

II. Endüstriyal Yapı, Yapısal Değişim ve Verimlilik Büyümesi

Bu bölümün amacı endüstriyel yapı ile ekonomik performans ve/veya endüstrileşme düzeyi arasındaki ilişkiler üzerine kanıtlar sunmaktır. Çunkü endüstriyel yapı ile ekonomik kalkınma biribirinden bağımsız olamaz. Nitekim endüstriyel kalkınma literatürü yapısal değişimi verimlilik artışının kaynaklarından biri olarak algılamaktadır (Denison, 1967; Thirwall, 1999 ve 2002; Chenery, 1979; Cheneary *et .al,* 1986; Cornwall ve Cornwall, 1994). Böyle bir algılamanın altında yatan temel neden, faktör getirilerinin endüstriler arası dağılımının farklı olduğu durumlarda, üretim faktörlerinin yeniden dağılımının verimlilik artışına neden olabileceği gerçeğidir (Syrquin, 1984: 77). Fakat, faktörlerin endüstriler arası yeniden dağılımının ilave verimlilik artışı

yaratabilmesi için, üretim faktörlerinin düşük verimli endüstrilerden yüksek verimli endüstrilere kayması gerekmektedir.

Büyüme literatüründe, 1980'lere kadar, yapısal değişim denildiğinde ilk akla gelen, genel ekonomi düzeyindeki değişimdi (*üç-sektör hipotezi*). Yani, faktörlerin tarımdan sanayi sektörüne yada hizmet sektörüne kayması. Oysa imalat sanayiinin alt endüstrileri arasında da bir yapısal değişim söz konusu olabilir. Fakat, bu düzeydeki yapısal değişimi inceleyen çalışmaların oldukça sınırlı sayıda olduğunu söyleyebiliriz (Timmer ve Szirmai, 2000; Fagerberg, 2000 ve Peneder, 2001). Bu nedenle, bu çalışma imalat sanayii alt endüstrileri arasındaki yapısal değişimi incelemektedir.

Bu bölümde elde edilen bulgular şöyle özetlenebilir: 1965'ten 1999'a kadar geçen 35 yıllık dönemde, uzmanlaşmış (specialised-supplier) ve bilime dayalı endüstrilerin en fazla üretim (katma değer olarak), verimlilik ve ticaret artışı kaydettiğini gözlemledik. Bu dönemde hızlı büyüyen ülkelerin (Kore, İrlanda, Malezya, Endonezya, Malta, Filipinler, Singapur ve Türkiye) imalat sanayilerinin çok ciddi bir büyüme performansı gösterdiğini rahatlıkla söyleyebiliriz. Dahası, endüstrileşme sürecinde imalat sanayiinin çok önemli değişimler sergilediğini gözlemledik. Daha açık bir ifade ile, endüstrileşme patikasında, emek ve kaynak yoğun endüstrilerin toplam imalat sanayii üretimi ve ticareti içerisindeki payları hızla düşerken, özellikle uzmanlaşmış endüstrilerin üretim ve ticaretlerin payının hızla artığını gözlemledik.

Diğer taraftan, yapısal değişimin imalat sanayii toplam verimlilik artışına etkisinin sınırlı sayıda ülkede gerçekleştiği sonucuna vardık (Endonezya, İran, İrlanda, Ürdün, Malta ve Singapur). Bu sonuç, işgücü verimliliği artışında yapısal değişim çok önemli bir etkiye sahip olmadığını, endüstriyel olarak başarılı olan ülkelerin, imalat sanayilerinin bütün alt endüstrilerinde yüksek verimlik artışlarına eriştikleri anlamına gelmektedir.

III. Teknoloji, Endüstriyel Yapı ve Ekonomik Performans

Geçtiğimiz yüzyılda, imalat sanayii uzun bir süre ekonomik büyümemin motoru olarak görüldü. Fakat şimdilerde büyüme ve rekabet edebilirlik için imalat sanayiinin salt varlığından çok daha önemli olan teknolojik yapısıdır (Fagerberg, 2002). Dolayısıyla, imalat sanayii üretim ve ihracatının teknolojik yapısı endüstriyel kalkınmada önemli bir rol oynamaktadır. Çalışmanın bu bölümünde, farklı ülkelerin üretim ve ticaretlerinin ve özellikle ihracatlarının teknolojik yapısının zaman içerisindeki gelişiminin incelenmesinin altında yatan temel neden de budur. Çünkü bir ülkenin üretim ve ticaretinin teknolojik yapısı, aslında, o ülkenin sahip olduğu varlıkları (doğal kaynaklar, sermaye, işgücü ve teknoloji), yetenek ve uzmanlaşma düzeyini yansıtır (OECD, 1996; Krugman, 1995; Lall, 2000; Montobbio and Rampa, 2005).

Bu bölümde ele alınan diğer bir konu ise "yapısal yakınsama" dır. Yapısal yakınsama endüstriyel yapının evrimi ile endüstriyel kalkınma arasındaki ilişki olarak tanımlanabilir. Abegaz (2002) yapısal yakınsamanın önemini şöyle özetlemektedir:

> *yapısal yakınsamanın varlığı endüstrileşmenin itici güçlerinin üretim faktörleri, kurumsal altyapı, tarih yada coğrafya farlılıklarından ziyade; teknoloji, tercih ve gelir düzeylerinin artan benzeşmesinden oluştuğunu ifade eder (Abegaz, 2002: 71)*

Abegaz (2002) gibi, endüstriyal yapı ve endüstriyel kalkınma arasındaki iki yönlü bir ilişki olduğunu düşünüyoruz. Bu ilişki şöyle açıklanabilir: İmalat sanayiindeki endüstriler arası büyüme faklılıkları endüstriyel yapıyı değiştirmekte, ve değişen yapı ekonomilerin daha sonraki endüstriyel büyüme performanslarını şekillendirmektedir.

Tezin üçüncü bölümündeki bulgular şöyle özetlenebilir: İmalat sanayiinin teknolojik yapısı ile endüstriyel peformans arasında güçlü bir ilişki yer almaktadır. Bunu söylememizin nedeni, azgelişmiş ülkelerin sanayii yapılarının daha çok düşük teknolojili üretim ve ihracata dayanırken, endüstrileşmiş

ülkelerin üretim ve ihracatlarının daha çok orta ve yüksek teknolojili ürünlerden oluştuğunun resmini çizmiş olmamızdır.

Ülkeler arası endüstri yapılarında bir yakınsama olup olmadığını incelemek için başvurduğumuz faktör analizi sonuçları, imalat sanayii yapılarında genel olarak bir yakınsama eğiliminin olmadığını, aksine endüstriyel yapılara göre üç farklı ülke kulübünün olduğunu ortaya çıkardı. Bulgular, bu kulüplerden birini endüstrileşmiş (gelişmiş) ülkeler oluştururken, diğerini az gelişmiş (endüstrileşmiş) ülkelerin oluşturduğunu gösterdi. Üçüncü kulubün ise bu iki kulübe ait olamayan ülkelerden oluştuğunu söyleyebiliriz. Türkiyenin bu üçüncü kulübte yer alması ise bu analizin ilginç ama aynı zamanda tutarlı bulgularından birisidir. 1965'ten 1999'a kadar geçen zaman zarfında, azgelişmiş ülkeler kulubünden gelişmiş ülkeler kulübüne geçiş yapmaya başaran ülkelerin bu dönemde hızla endüstrileşen ülkeler (Kore, İrlanda, Malazya ve Singapur) olması şaşırtıcı olmasa gerek.

Bu bulgular endüstriyel üretim ve ticaret alanında, ülkeler arasında bir çeşit işbölümünün varlığına işaret etmekle birlikte, azgelişmiş ülkelerin daha çok düşük teknolojili, emek ve kaynak yoğun endüstrilerde uzmanlaşmaları, böyle bir işbölümünün birkaç istisna dışında azgelişmiş ülkelerin endüstrileşmelerine en azından şu ana kadar bir katkıda bulunmadığını göstermektedir. Böyle bir iddianın çıkış noktası, doğaldır ki, üretim ve ticaretin teknolojik yapısının endüstrileşme ve büyüme için önemli olmasından kaynaklanmaktadır.

IV. İşgücü Piyasası Düzenlemesi ve Ekonomik Performans

Ekonomik performans ve işgücü piyaları söz konusu olduğunda, akla gelen en önemli kavramlardan birisi işgücü piyasası esnekliği yada katılığıdır. İşgücü piyasalarının esnekliğini, katılığını, yada degişen koşullara adapte olabilme yeteneğini işgücü piyasası kurumları ve bunların etkileşimi belirlemektedir. Dolayısıyla, bir ekonomide varolan işgücü piyasası kurumları, firmaların, daha

makro düzeyde de endüstrilerin yada ekonominin, üretim ve verimlilik düzeylerini etkileyebilecek önemli sonuçlar doğurabilir.

İşgücü piyasası esnekliği, genel anlamda, bir üretim faktörü olarak emek girdisinin miktar, kalite ve fiyatının değişen koşullara cevap verebilme yeteneği olarak ifade edilebilir (Standing, 1986; Molleman ve Slomp, 1999). Çalışma ekonomisi literatürünün, işgücü piyasası esnekliği ile verimlilik arasındaki ilişki konusunda kesin bir yargıya vardığını söylemek güç olabilir. Bazı iktisatçılar, esnek olamayan işgücü piyasalarının üretim faktörlerinin etkin dağılımı önleyeceğini ileri sürmektedirler. Fakat, ürün ve faktör piyasaları tam anlamı ile rekabetçi bir yapıya sahip olmadığı sürece, ki gerçekte durum böyledir, tamamen esnek bir işgücü piyasası emek dahil olmak üzere hiç bir üretim faktörünün etkin dağılımını garantileyemeyebilir (OECD, 1994 ve 1996; Salvanaes, 1997; Scarpette ve Tressel, 2002). Dahası, işgücü piyasalarındaki bazı düzenlemeler çeşitli mekanizmalarla beşeri sermaye birikimine, ve böylece verimlilik ve gelir artışına neden olabilir (Cahuc ve Michel, 1996: 1464).

Asgari ücret düzenmeleri, iş güvenliği yasaları bu tür düzenlemelerden sadece bir kaçıdır. Acemoglu and Pischke (1999), örneğin, rekabetçi olmayan işgücü piyasalarında asgari ücret uygulamalarının firmaların eğitim harcamalarını artırdığını göstermişlerdir. Bunun arkasında yatan temel neden, asgari ücret uygulamalarının ücret düzeyini serbest piyasa ücret düzeyinin üzerine çekmesi nedeni ile, işe uygun olmayan işçilerin istihdamını firma için daha maliyetli hale getirmesidir. Benzer şekilde, Arulampalam ve Booth (1998), işgücü piyasası esnekliği ile iş-ile-ilgili eğitim arasında ters bir ilişkinin varolduğunu bulmuşlardır. İşgücü piyasalarının fazla esnek olduğu durumlarda, firmalar kendi işçilerini eğitmek yerine standart olmayan çalışma ilşkilerini (taşeron kullanmak, geçici işçiler istihdam etmek, vb.) tercih edebilirler.

Çalışmanın bu bölümü, işgücü piyasası yapısı ile ekonomik performans arasında ne tür bir ilişkinin varolduğunu açıklamayı amaçlamaktadır. Bu ilişkiyi açıklayabilmek için, ilk olarak, işgücü piyasalarını düzenleyen çeşitli

konulardaki yasa sayılarına dayanan yeni bir "işgücü piyasası düzenleme endeksi" geliştirdik. Bu endeks, Uluslararası Çalışma Örgütünün (ILO) "Natlex" adlı 2002 yılına ait veri seti kullanılarak elde edildi. Bu veri seti ülkelerdeki "ulusal işgücü, sosyal güvenlik ve ilgili insan hakları" konularındaki yasama faaliyetlerini (kanun sayısı olarak) içermektedir. Bu endeksin öncelikle işgücü piyasalarının dezenlenme derecesini yansıttığını; ve eğer işgücü piyasaları ile ilgili yasama faliyetleri çalışma ilişkilerinde esnekliği artıran düzenlemeler içeriyor ise, bu düzenlemelerin verimlilik artışı ile pozitif bir ilişkiye sahip olan fonksiyonel esnekliği artırabilecegini varsaydık. Kullandığımız diğer bir işgücü piyasası esneklik ölçütü ise endüstriler arası ücret faklılıklarıdır (ücret esnekliği).

İşgücü piyasaları ile verimlilik arasındaki ilişkileri incelediğimiz bölümdeki analizler gösterdi ki; işgücü piyasası düzenlemeleri ile ücret esnekliği arasında ters bir ilişki mevcuttur. Daha da önemlisi, ekonometrik kestirim sonuçları ücret esnekliği ile imalat sanayii verimliliği arasında ters bir ilişki var iken, işgücü piyasalarındaki düzenmelerin daha yüksek verimlilikle ilişkili olduğunu göstermiştir.

V. Sonuç

1965 yılından 1999 yılına kadar, analizlere göre küçük değişiklikler göstermekle birlikte, farklı gelişmişlik düzeylerine sahip yaklaşık 50 ülkenin incelendiği bu çalışma; endüstriyel yapı, verimlilik artışı ve işgücü piyasası yapıları arasındaki ilişkiler konusunda önemli bulgular sunmaktadır.

Özellikle azgelişmiş ülkeler için bu çalışmadan çıkarılacak dersler şöyle özetlenebilir.

- Azgelişmiş yada gelişmekte olan bir ülke için, endüstrileşme ve kalkınmanın ilk koşulu yerleşik bir imalat sanayiine sahip olmaktır.

- İmalat sanayii üretim ve ihracatının çeşitlilik arz etmesi ise birinci koşulu tamamlayan diğer bir gerekliliktir.
- Endüstriyel üretim ve ihracatın zaman içerisinde bilim ve teknolojiye dayalı sektörlere doğru kayması, imalat sanayii verimliliği ve rekabet edebilirliliği artırarak, endüstrileşme sürecine yardımcı olacaktır.
- Son olarak, bu çalışma esnek işgücü piyasalarının imalat sanayiinde verimlilik artışına neden olamayacağını; kurallarla düzenlenmiş, hatta belki biraz "katı" işgücü piyasalarının verimlilik artışında daha önemli rol üstlenebileceğini göstermiştir.

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Fields of Interest

- Economics of technology and innovation,
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Education

- ***2005*** Ph.D. in Economics, Middle East Technical University, Department of Economics, Ankara, Turkey.
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- ***1997*** M.A. in Economics, Department of Economics, Northeastern University, Boston, MA, USA.
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Articles

- 2005, "Determinants of Subcontracting and Regional Development: An Empirical Study on Turkish Textile and Engineering Industries" (with E. Taymaz), *Regional Studies* (forthcoming in July, 2005).

Presentations

- 2005, "Locating Population Dynamics in Explaining Regional Income Differentials", *Conference on the Middle East and North African Economies: Past Perspectives and Future Challenges*, Brussels, June 2-4, 2005. (with Guldem Saral)

- 2004, "Structural Change, Productivity and Competitiveness in MENA Countries", *ERF 11th Annual Conference*, Beirut, Lebanon, December 14-16. (with E. Taymaz)

- 2004, "Productivity Growth and Structural Change", *Asia-Pacific Productivity Conference*, Brisbane, Australia, July 14-16. (with E. Taymaz)

- 2002, "Size mobility and determinants of survival: An analysis of the major 250 industrial enterprises of Turkey, 1993-98.", *European Applied Business Research Conference*, Rothenburg, Germany, June 17-21. (Best paper award)

- 2000, "Subcontracting: A Model for Industrial Development?", *ERF 7th Annual Conference, Amman, Jordan*, October 26-29. (with E. Taymaz)

Working papers

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Work experience

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Course Teaching
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