

*TRADE, MARKET STRUCTURE AND WAGES
IN INDIAN ORGANISED MANUFACTURING INDUSTRIES*

**TRADE, MARKET STRUCTURE AND WAGES
IN INDIAN ORGANISED MANUFACTURING INDUSTRIES**

*Dissertation submitted in partial fulfillment of the requirements for the
Degree of Master of Philosophy in Applied Economics of
Jawaharlal Nehru University*

SOUMYA GEORGE

M.Phil Programme in Applied Economics

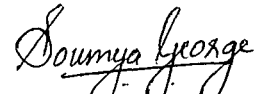
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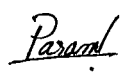
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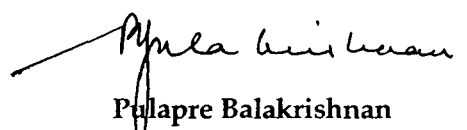
30th June 2011


Soumya George

Certified that this study is the bona fide work of Soumya George, carried out under our supervision at the Centre for Development Studies.


Prof. K Pushpangadan
Professor


Dr. M Parameswaran
Assistant Professor


Pulapre Balakrishnan
Director
Centre for Development Studies.

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Abstract of the Dissertation

TRADE, MARKET STRUCTURE AND WAGES IN INDIAN ORGANISED MANUFACTURING INDUSTRIES

Soumya George

M.Phil Programme in Applied Economics, Jawaharlal Nehru University

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Centre for Development Studies

The Government of India embarked on drastic economic reform in 1991 after a phase of gradual deregulation during the 1980s. The basic frame of analysis is that market power leads to higher wages. Given this, when trade opens, promotion of imports as well as exports occurs. More imports means fall in profits of domestic industries which were previously captured by the industry due to market power. This will lead to fall in wages in those industries. Increase in export leads to increase in profits as there is imperfect competition in the international market and therefore more wages in those industries. The study is confined to organized manufacturing industries. The period of analysis for the study is 1991-92 to 2006-07. The data sources used are Annual Survey of Industries (ASI), COMTRADE, Centre for Monitoring Indian Economy (CMIE) and Labour Statistics.

The study gives an overview of industrial, trade reforms and labour reforms during the structural reforms of 1991. We found that Indian labour market is rigid in appearance but flexible in function and there is an increase in openness to trade. It also shows that market structure has statistically significant influence on market structure. The results show that the adverse wage effect of imports in concentrated industries is stronger than the wage effect of imports in a competitive industry. For exports, positive wage effect is greater in concentrated industries than in competitive domestic industry. It is also seen that profits are shared with employees only in technology intensive industries.

Key Words: Trade, Market Structure, Wages

Chapter 1

Introduction

1.1 Introduction

During the 1980s India was described as “one of the most complicated and protectionist regimes in the world” (International Monetary Fund, 1998). Following the macroeconomic crisis in 1991 the Government of India embarked on drastic economic reforms. Since 1991 the Government of India has greatly liberalised the scope of corporate activities. This liberalisation includes removal of trade restrictions, and abolition of permission requirements for entry, expansion, security issues, introduction of new products and so forth. Such liberalisation may have intensified the extent of product market competition. The direct manifestation of social cost of liberalisation is on labour market, which may work through its impact on employment and wages.

The labour market in India is dualistic in nature where a large unorganized sector coexists with the organised sector. There are many regulations in India that apply only to the organised sector and some of the regulations are considered extremely constraining to the employers leading to rigidities in the labour market. They are stringent rules related to firing of employees and closing of industries, minimum wage legislation which raise the cost of hiring workers etc.

The modest but growing literature in this field mainly focused on the relation between economic reforms and relative industry wages by empirically exploring different theoretical channels through which trade liberalization affect wages. The general trend in the literature in India has been to investigate the determinants of wages and their implication on wage inequality. But this study attempts an econometric examination of the link between trade and wages in India. Two studies that deserve mention are by Goldar (2002) and Tendulkar (2003) both of which are mainly concerned with the estimation of wage, labour productivity and employment growth in the pre- and post- reforms period. Both of these studies examine the

trends in employment and wages and their linkage with productivity for the Indian manufacturing sector. Similarly, Dutt (2003) and Goldar (2003), who examined the effect of trade protection on average industry product wage¹, did not find any significant relationship between trade and wage growth. On a different side, Banga (2005) examines the impact of FDI, trade and technology on wages and employment, using panel methods, thereby showing that FDI, trade and technological progress have differential impact on wages and employment.

1.2. Trade, Market Structure and Wages: Theory and Empirical Evidence

1.2.1 Theoretical Evidence

The basic frame of analysis is that market power leads to higher wages. The reasons underlying the hypothesis are market power generates higher rents and these may be captured by employees in the form of higher wages (Nickell, 1999). This is called 'monopoly wage hypothesis' (Kwoka, 1983). The other reasons given for the concentrated industries to do so are labor costs in concentrated industries can be more easily passed on to consumers, the small number of firms in concentrated industries makes it easier for unions to organize and raise wages, the life of managers will be more comfortable, it allows firms to avoid productivity falls as a result worker feeling unfairly treated (Long and Link, 1983). Given this, when trade opens, promotion of imports as well as exports occurs. More imports means fall in profits of domestic industries which were previously captured by the industry due to market power. This will lead to fall in wages in those industries. Increase in export leads to increase in profits as there is imperfect competition in the international market and therefore more wages in those industries. But the empirical evidence of the impact of trade on wages is controversial. To resolve the controversy Martins (1994) in his paper argued that wages depend upon the market structure of the industries penetrated by trade. Imports of goods in concentrated markets have a

¹ The product wage is the cost of hiring workers faced by the employer as opposed to the wage that workers actually receive.

much larger impact on wages than imports of goods produced in competitive markets (Borjas et. al. (1995) and exports of goods in concentrated market have a much larger impact on wages than exports from competitive industry.

1.2.2 Empirical evidence

1.2.2.1 Market Structure and Wages

A study conducted by Landon (1970) on US newspaper industry has shown a negative relationship between market concentration and wages. The sample of 1,514 wage and salary employees in private, regulated industries and unregulated manufacturing in US shows there is positive and significant relationship between concentration and wage (Long and Link, 1983). Similarly data on 814 British manufacturing companies between 1972 and 1986 shows that there is significant positive relation between wages and product market power (Nickell et al, 1994). Another study at establishment level in Britain and Australia in 1990 on product market competition and wages reveals that competition reduces wages (Blanchflower and Machin, 1996). Thus the results of empirical studies shows that there is positive relation between concentration and wages except one study which shows a negative relation.

1.2.2.2 Trade and Wages

The paper that investigates the effect of increased import competition on U.S manufacturing on wages, using data for a panel of manufacturing industries over the 1977-1987 periods finds that changes in import prices have a significant effect on wages (Revenega, 1992). Another analysis by Lawrence et. al. in 1993 finds no evidence for such a negative link in the data of US manufacturing industries at the three digit level between 1971 and 1991. Gaston and Trefler (1994) in their study on trade and wages using individual wage data on 20000 manufacturing workers of US in 1984 and with trade data from UNCTAD found that exports have a positive effect on wages and imports have a negative effect.

1.2.2.3 Trade, Market Structure and Wages

To resolve the above controversy between trade and wages, market structure of the industry penetrated by trade was also included in the analysis (Martins, 1994). This is because the import in a concentrated industry has more adverse effect on wages than import in a competitive industry and in the case of exports; the wages effect is greater in concentrated industry than in a competitive industry. He in his paper finds evidence that the impact of import penetration on wages is negative in low differentiated products and positive in high differentiated products. He also finds that in low differentiated industries the impact of export intensity on wages is high compared to industries with high differentiated products.

Thus the empirical evidence suggest that interaction between market structure and trade variable on one hand and pattern of industrial wages on the other hand are closely related

1.3 Problem of the study

The studies so far done to explore the relation between trade and wages are in developed countries. In Indian context, however there is very little empirical research in terms of effect of trade on wages and this study is an attempt in this direction.

1.3.1 Objectives

The present study is intended to reveal the impact of international trade and domestic market structure on industrial wages in the context of organized manufacturing sector in India.

1.3.2 Limitations of the Study

The present study has the following limitations, which are to be kept in mind while drawing inferences from the analysis. Firstly, the study is confined to organized

manufacturing sector, which is employing only 8 percent of the workforce. The remaining 92 percent of the workforce are engaged in unorganized sector (Sakhivel et.al, 2006). Secondly, in India a significant percentage of exports are done by unorganized sector which is also included in the data on exports. So we should be cautious in interpreting the results. Thirdly, the study uses average industry wage data which treat average industry wage earnings as being independent of individual characteristics of employees. This may exaggerate the effect of import and export on wages (Gaston and Trefler, 1994)

1.4 Data Source

The present study uses secondary data sources of organized manufacturing industries in India. They are Annual Survey of Industries (ASI) Database brought out by Central Statistical Organisation (CSO) for the period 1991-92 to 2007-08. It covers all factories registered under Sections 2m(i) and 2m(ii) of the Factories Act, 1948 i.e. *those factories employing 10 or more workers using power; and those employing 20 or more workers without using power*. The data from ASI follows National Industrial Classification of 1998 (NIC-98).

The source of trade data in the study is the United Nations Statistical Department which collects data from the individual countries and reports in the Commodity Trade Statistics (COMTRADE). The trade data reported in Standard International Trade Classification (SITC), have been harmonized with ISIC Rev.3 using the concordance developed by Organization for Economic Cooperation and Development (OECD).² Both import and export data are available in 2 and 3 digit of ISIC Rev.3. The World Integrated Trade Solution (WITS) software was used to extract the data. The data reported in US\$ are converted into Indian rupee using exchange rate.

² For further information about the database see Parameswaran (2009)

As NIC98 follows ISIC Rev.3 classification up to 4-digit level, ASI data and trade data from COMTRADE are similar (CSO, 2011).

The third data source for the study is Centre for Monitoring Indian Economy (CMIE) Database. It contains data on more than 9000 firms. It also follows NIC98 classification. Fourthly the study derives data from Indian Labour Statistics. Here data from 1991 to 1999 is in NIC87 classification and from 2000 to 2006 is in NIC98 classification. Here concordance procedures are used to covert NIC87 to NIC98 classification (Appendix 1.1)

The selection of the study period is based on the availability of data. As ASI does not provide wage data, it is derived by dividing the total emoluments by the total persons engaged in an industry.

1.5 Chapter Scheme

The present study is organised into four chapters, first being the introduction. Next chapter discusses the trends and patterns in trade, market structure and wages. It also gives a background of economic reforms in India i.e. trade and industrial reforms as well as labour market reforms. The third chapter empirically analyse the impact of international trade and domestic market structure on industrial wages. It also gives a detailed explanation of the data and the methodology used. The findings and conclusions are summarized in the last chapter.

Chapter 2

Trade, Market Structure and Wages: Trend Analysis

2.1 Introduction

The key elements of India's pre-reform development model were rapid industrialisation with the prioritisation of capital goods over consumer goods, state control and regulation over the economy, and inward-orientation. It is widely recognised that this highly protective trade regime seriously affected the efficiency of Indian industries and contributed to high cost of production as well as to lack of technological dynamism. All these were finally reflected in India's poor export performance: its share in world exports which was 2 percent in 1950 fell to 0.5 percent in 1990 (Srinivasan, 1993).

This led to an attempt to reform the Indian economy in the late 1980s especially with respect to industrial deregulation. However, the 1980s ended with a severe macroeconomic crisis in the winter of 1990-91 that necessitated a drastic stabilisation and structural reform programme (Kapila, 2006). The latter focused primarily on trade and industrial policy reform but also encompassed financial sector reforms as well as institutional reforms relating to reform of labour, company, rent and land control laws and the establishment of adequate regulatory bodies (Ahluwalia, 2002; Srinivasan and Bhagwati, 1993).

Trade liberalization influences the product market structures. The relaxation of trade barriers induces a pro-competitive effect. This is by creating a larger market that is capable of supporting a large number of firms trade liberalization increases market competition (Markusen et al, 1995). As demand for labour is derived demand, trade liberalisation has important repercussions on labour market. As this study pertains to wages in organized manufacturing industries we only look into the trend in trade, market structure and wage for the period 1991-92 to 2007-08.

With the brief introduction as the first section, the remaining part of the chapter is organized in five sections. Section two provides the different aspects of trade and industrial policy. Section three shows the trend in market structure. Section four is on labour market reforms. Section five highlights some trends and patterns in profits and wages after 1991. Section six gives bivariate analysis between trade, market structure and wage and this chapter ends with some concluding remarks.

2.2 Trade and Industrial Reforms

2.2.1 Trade Reforms

The Indian tariff structure comprises of a basic import duty (these are the statutory most favoured nation tariffs) and an auxiliary import duty on all imports. The tariff rates are mainly ad valorem with a few specific and composite rates. Additional import duties or countervailing duties (equivalent to the excise duty on like goods produced or manufactured in India) are also levied. A few goods are also subject to export taxes. The tariff structure is complicated by the presence of numerous exemptions such as general, end-use, specific user and preferential area exemptions. In the early 1990s there was a substantial reduction in levels and dispersion of tariff rates as well as in the number of exemptions (Nouroz, 2001).

Table 2.1: Evolution of Tariff Rates

Year	Average tariff rate	
	Whole economy	Manufacturing Sector
1990-91	126	126
1993-94	71	73
1995-96	41	42
1996-97	39	40
1997-98	35	36
1998-99	40	41
1999-00	40	40

Source: Reproduced from Jain (1999) and Rajan and Sen (2001)

During the 1990s the average tariff rates fell from 126 percent in 1990-91 to 40 percent in 1999-2000 (Jain, 1999). The average effective tariff rate was reduced from 86 percent in 1989-90 to about 40 percent in 1994-95 and further to about 30 percent in 1999-2000 (Goldar, 2002). From the above discussions it is clear that there has been a substantial reduction in the general levels of tariff rates in the 1990s.

The extent of non-tariff barriers (NTBs) was also high during the 1980s (Pandey, 1998). By the mid 1990s capital goods and intermediates were no longer subject to import licensing and could be freely imported on the OGL list (Kaliranjan, 2001). The collection rate of import duty on the value of import came down similarly from 52 percent in 1989-90 to about 29 percent in 1995-96 and further to about 24 percent in 1999-2000. Most of the NTBs on manufacturing was removed or decreased substantially in 1991. A study by Pursell (1996) shows that, the NTB coverage for manufacturing sector declined from 90 percent to 36 percent between 1990 and 1995. For aggregate manufacturing, the decline in NTB coverage further declined to 28 percent in 1999-2000 (NCAER, 2000)

The process of liberalizing trade continued in 1990s. The EXIM policy of 1992-97 reduced the number of items subject to export control from 439 to 296. In 1993, the negative list was reduced to 215 with further reductions over the few years. The EXIM policy of 1997-2002 has led to further reductions in the NTB coverage of imports. Out of the total 10,281 tariff lines 7,213 lines were free in 1998-99. The remaining came under the NTBs. Most of these came under the category of "restricted" (Mehta, 1999)

2.2.2 Industrial Sector Reforms

The industrial regulatory policy until the mid-1980s was highly restrictive in terms of the decisions regarding capacity expansion, product mix and location decisions of firms. Industrial policy reforms were with respect to licensing, capacity expansion,

small-scale sector regulations, the role of public sector enterprises, large firms and foreign investment (Kapila, 2006).

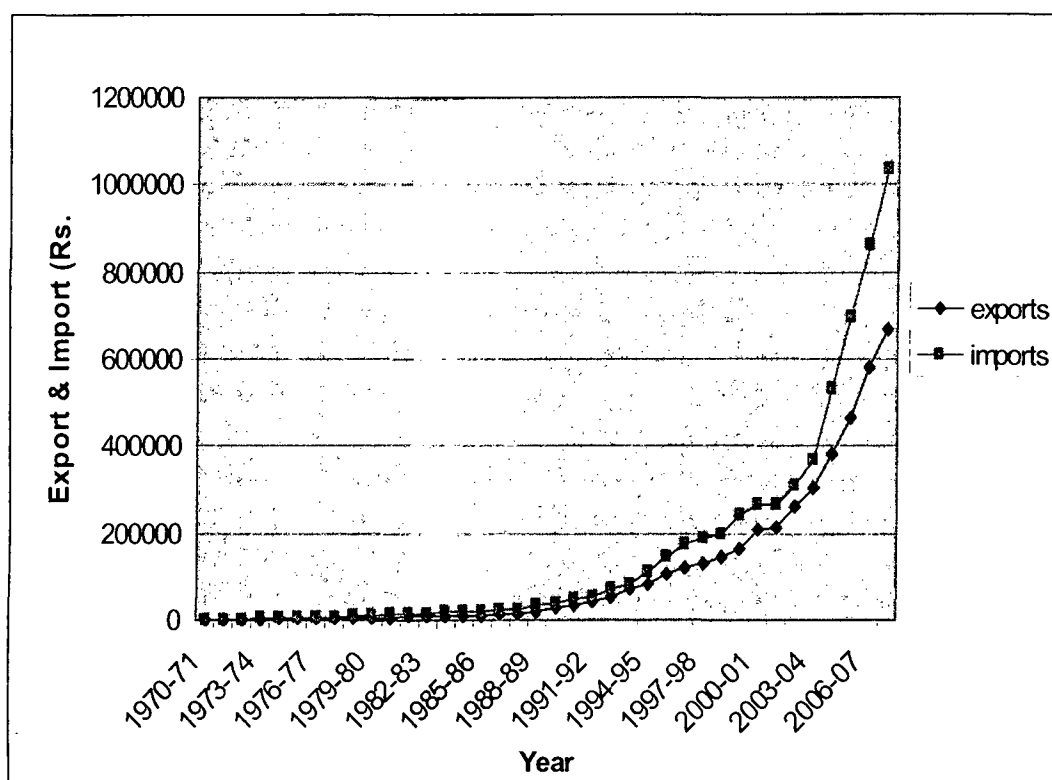
The Industries (Development and Regulation) Act (IRDA), 1951, required the owner of any industrial unit to obtain a license from the government in order to start production, produce a new product, expand existing capacity or enter a new market. Essentially this allowed the government control over private investment. Firms below a certain size of fixed investment were exempted from licensing requirements and firms classified in the small-scale sector were given additional privileges including the reservation of certain items for their exclusive production. There were additional restrictions on location and on investments made by large business houses. Schedules A and B of the IDRA defined state-dominated industries – the former listed 17 industries which were reserved for production by the public sector only while the latter listed industries that had some private sector participation but were predominantly state-led. “Industrial licensing generated considerable red tape as well as strong political pressure; under the influence of both it underwent frequent tightening and relaxation” (Desai, 1992). Systematic deregulation began in earnest in the mid-1980s. By 1989, 27 items were subject to licensing. Further deregulation in the 1990s brought this down to 18 items in 1993 and finally to only 6 in 1999 (Misra and Puri, 2001; Sandesara, 1992). The reforms in 1991 also sought to reduce the role of the public sector by abolishing Schedule B. The aim was to limit public sector participation in providing infrastructural services (Ahluwalia, 2002; Basu, 1993).

The minimum size of firms qualifying for small-scale sector concessions was raised for firms engaged in export. The restrictions on investment by large business houses were gradually relaxed in the late 1980s provided these houses generated sufficient export revenue or were located in backward areas and the minimum asset limit

was raised. In 1991 the distinction between business houses and other companies was eliminated and the rules pertaining to industrial location were also relaxed (Desai, 1992).

The trade and industrial reforms together resulted in increase in exports and imports after 1991. This is shown in figure. 2.1 (Rupees in Crores)

Figure 2.1: Trend in Export and Import of India



Source: Handbook on Indian Economy by RBI

From the above figure we could see that there is a sudden spurge in exports and imports after 1990-91 which coincide with the economic reforms of 1990s. This is in line with our reasoning that when an economy opens for trade more exports and imports take place.

Table 2.2: Indicators of Openness to Trade

Year	Trade/GDP	Exports/GDP	Imports/GDP
1991	0.11	0.06	0.04
1992	0.12	0.07	0.05
1993	0.14	0.08	0.06
1994	0.15	0.08	0.07
1995	0.16	0.08	0.08
1996	0.15	0.08	0.07
1997	0.15	0.08	0.07
1998	0.15	0.08	0.07
1999	0.15	0.08	0.07
2000	0.15	0.09	0.06
2001	0.15	0.09	0.06
2002	0.17	0.10	0.07
2003	0.18	0.10	0.08
2004	0.21	0.11	0.10
2005	0.24	0.12	0.12
2006	0.25	0.13	0.13
2007	0.26	0.13	0.13

Source: Handbook on Indian Economy by RBI and WITS

After normalizing for the trade data, we have the following results in Table 2.2. It shows openness of Indian economy measured by trade share in GDP which increased from 11 percent in 1991-92 to 26 percent in 2007-08. In the same time period exports to GDP rose from 6 percent to 13 percent and imports to GDP rose from 4 percent to 13 percent.

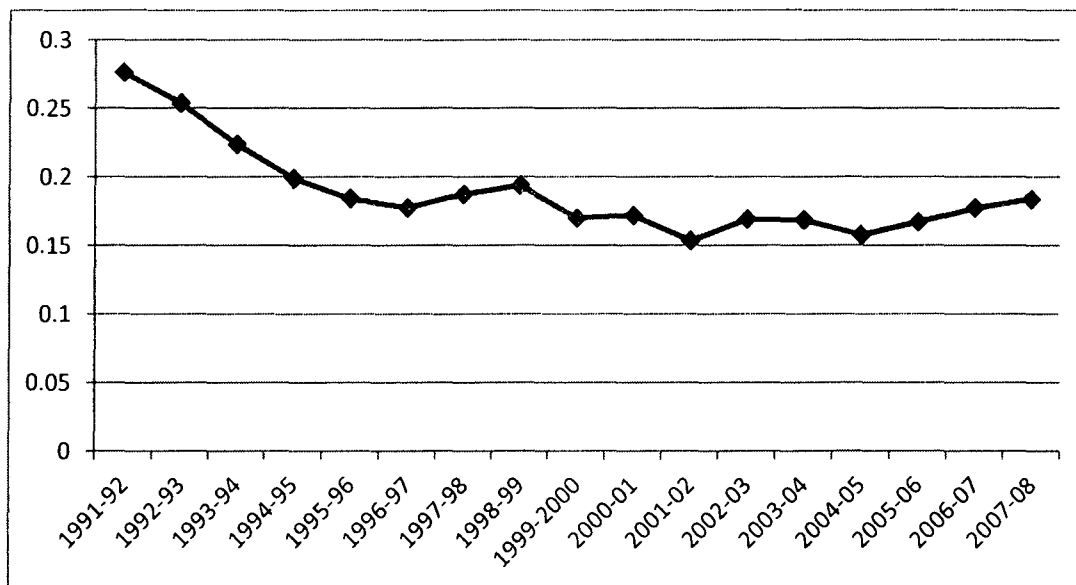
The reduction in tariffs and NTBs as well as the increase in trade share shows that Indian economy is more open now.

2.3 Trend in market structure of manufacturing industries

There are number of indices to signify market power or concentration. But the choice is guided by more practical considerations like availability of data, ease of

computation etc. Here we use Herfindahl index to measure market concentration as it is considered to be the most comprehensive index of market power.

Figure 2.2: Trend in Herfindahl Index from 1991-92 to 2007-08



Source: CMIE database

Note: Herfindahl index is the average of whole industry

Figure 2.2 shows that there is fall in herfindahl index between 1991-92 and 2007-08 which in turn means that there is a reduction in concentration over the period.

2.4 Labour Market Reforms

Modifying labour laws to enhance flexibility in labour market was envisaged as part of the economic reforms that commenced in 1991. However, lack of consensus and political instability at the center have delayed the passage of industrial relations reforms. Yet a handful of changes have been made in recent years.

The labour laws in India essentially cover workers working in the organised sector only i.e. only 9 percent of the total work force. Labour market legislation is enforced through the provisions of different Central Acts and Laws- the Factories Act of 1948 regulates working conditions, the Industrial Disputes Act (IDA) of 1947 and the Industrial Employment (Standing Orders) Act of 1946 regulate employment security

and the Trade Union Act (TUA) of 1926 regulates trade union activity. While a comprehensive review of the labour market legislation in India is beyond the scope of this chapter, it is important to highlight that the opinions on the pace and further need of labour market reforms in India remain highly polarised. On one hand, pro-reforms analysts [Panagariya (2007)] believe that the numerous labour laws in India have created rigidities in the labour market. On the other hand, there are analysts [Nagaraj (2002), Dutt (2003)] who offer counterarguments to the above view by highlighting that labour regulations in India are either ignored or circumvented thus rendering them ineffective. In addition to this, Besley and Burgess (2004) point out that firms located in different states in India face different and often confused regulatory environments due to the entitlement of both central and state governments to legislate on labour issues. The labour market reforms in India have not picked up momentum despite the extensive and radical trade and industrial policy reforms. In fact, Dutta (2007) points out that reforms aimed at increasing flexibility with respect to laying off employees³, outsourcing and sub-contracting were initialised only in 2002. Besides, there is a prevalent wage setting system in India, whereby the Wage Boards and Pay Commissions generally sets wages in the public sector, which sets the benchmark for private sector wages. The labour market regulations along with the wage setting system and labour redundancy have introduced rigidities in the organised labour market [Dutta (2007)].

When India becomes increasingly open, there will be more competition. The market makes strategies to withstand this external competition. One way is through the systematic transfer of jobs from bargainable or unionized category to non-unionised category through re-designation of workers (Vijay, 2003). Rodrik (1997) has also come to the conclusion that there is weakening of trade unions after liberalization. The bargaining power of trade unions has further weakened by new managerial strategies like outsourcing and parallel production (Sharma, 2006). All thees

³ In 2002, the government decided to amend the Industrial Disputes Act of 1947, allowing or companies to lay off employees less than 1000 workers.

developments have weakened collective bargaining of employees. Nowadays fear of losing jobs compel unions to accept downsizing, productivity linked freezes in allowance and benefits (Papola, 1994). The weakening of workers bargaining capacity and rise in the militancy of employers are manifested in increasing incidence of lockouts and decline in incidence of strikes (Datt, 2003). Table 2.3 shows that, when strikes have been declining between 1991 and 2006, the lockouts have been increasing. This shows that power of trade unions to bargain is weakening.

Table 2.3: Number of Strikes and Lockouts in India and Number of Mandays Lost due to Strikes and Lockouts

Year	Strikes		Lockouts	
	Number	Mandays Lost (' 000)	Number	Mandays Lost (' 000)
1991	1278	12428	532	13999
1992	1011	15132	703	16126
1993	914	5614	479	14686
1994	808	6651	393	14332
1995	732	5720	334	10570
1996	763	7818	403	12467
1997	793	6295	512	10738
1998	665	9349	432	12713
2000	426	11959	345	16804
2001	372	5563	302	18204
2002	295	9665	284	16921
2003	255	3206	297	27050
2004	236	4829	241	19037
2005	227	10801	229	18864
2006	243	5318	187	15006

Source: Indian Labour Statistics (2006, 2007&2008)

All these have enabled the employers to resort to flexible practices on a wide-scale bypassing the formal rigidities of the labour market. Therefore it can be argued that the Indian labour market is rigid in appearance but flexible in function.

2.5 Wages and Profits During the Post Reform Period

Many studies have shown that there is a hike in wages after the reform period. (Ahluwalia, 1992; Ghosh, 1994).

Table 2.4: Share of Total Emoluments and Gross Profits in Value Added

Year	Share of total emoluments in value added	Share of gross profits in value added
1991-92	0.32	0.17
1992-93	0.34	0.18
1993-94	0.30	0.29
1994-95	0.29	0.34
1995-96	0.29	0.31
1996-97	0.30	0.29
1997-98	0.31	0.24
1998-99	0.30	0.27
1999-2000	0.27	0.25
2000-01	0.32	0.20
2001-02	0.32	0.19
2002-03	0.32	0.29
2003-04	0.28	0.37
2004-05	0.29	0.49
2005-06	0.21	0.51
2006-07	0.24	0.54
2007-08	0.25	0.54

Source: ASI database

When we look into the share of total emoluments in value added (Table 2.4), we see that its share has decreased from 32 percent in 1991-92 to 25 percent in 2007-08 whereas the share of profits in value added increased from 17 percent in 1991-92 to 54 percent in 2007-08. This shows that more of value added is taken by employer as profits than it is used to pay the employees.

Table 2.5: Gross Profits and Total Emoluments per Employee

Year	Gross profits per employee	Total emoluments per employee
1991-92	13464.63	25449.16
1992-93	16349.71	29531.93
1993-94	32291.82	31980.76
1994-95	45440.88	36151.58
1995-96	47778.68	41910.18
1996-97	47657.44	45331.19
1997-98	42018.40	49313.68
1998-99	55381.97	52603.78
1999-2000	59211.84	59531.98
2000-01	45124.95	64474.98
2001-02	44928.34	66828.86
2002-03	78685.41	70498.98
2003-04	118681.35	75085.08
2004-05	173955.19	77238.63
2005-06	205581.78	82204.84
2006-07	237488.50	86629.79
2007-08	286559.46	101957.82

Source: ASI database

Note: Gross profits and total emoluments are in constant prices.

From Table 2.5 we could see that, there is a positive relation between profits and wages. This also shows that when profits per employee increased more than 20 times between 1991-92 and 2007-08, total emoluments per employee only increased 4 times in the same period.

2.6 Relation between trade, market structure and wages

Having analysed the trends in trade, market structure and wages, it would be significant to see the relationship between these. The theoretical and empirical findings of the effect of trade, market structure and wage are given in the introductory chapter. Before estimating the effect of trade and market structure on wages, it would be significant to analyse the relation between trade and wages as

well as market structure and wages. For this we have done a bivariate analysis. Here export, import and wage are taken in real terms.

Table 2.6: Correlation Matrix of Annual Growth Rate of Trade, Market Structure and Wages Between 1991-92 and 2007-08

<i>Variables</i>	Export	Import	Herfindahl Index	Wage
Export	1	0.025	-0.147	0.124
Import		1	0.171	-0.169
Herfindahl Index			1	-0.002
Wage				1

Source: ASI, CMIE and WITS Database.

Table 2.6 shows a positive correlation between export and wage whereas for imports and market structure a negative correlation is noticed. This is in line with the empirical evidence. But all the correlations are found to be statistically insignificant in this bivariate analysis. To find out whether these relations hold well in multivariate analysis, this is taken up in the next chapter.

2.7 Summary and Findings

This chapter gives an overview of trade liberalization. This has led to marked decline in tariffs rates and NTBs which resulted in increased openness of the Indian economy. When we look into the measure of openness to trade i.e. trade share in GDP we found that it has been increasing since 1991-92. This gives the insight that India is becoming more competitive after trade liberalization. This gets reinforced by the declining trend in herfindahl index. Labour market reforms were also envisaged as part of structural reforms. But lack of political consensus and numerous laws like Minimum wages, Industrial Disputes Act created rigidities in organized labour market. To cope with the external competition, the market has made several survival strategies. This has led to the decline in strikes which shows that there is a decline in trade union power. Thus it can be argued that the Indian labour market is rigid in appearance but flexible in function. When we look into the profits and wages of

industries after the reform period, we find that the share of total emoluments in value added is on the decline and share of gross profits in value added is on the rise. We also found that when gross profits per employee increased 21 times between 1991-92 and 2007-08, the wages per employee only rose 4 times. This gives an indication that there is positive relation between profits and wages in organized manufacturing industry.

Chapter 3

Trade, Market Structure and Wages: An Empirical Analysis

3.1 Introduction

In the previous chapter, the study presented trends in trade, market structure and wages in organized manufacturing industries. In this chapter, an attempt is made to analyse the impact of trade on wages econometrically after controlling the industry specific variables in India's organized manufacturing industries. To analyse the differentiated impact of trade on wages, the industries are classified export oriented and import competing industries. The study employs panel data techniques to examine the factors affecting wages.

The chapter is organized as follows. First, it presents the analytical framework. Second section elucidates the economic model. Data set is discussed in the third section Fourth section explains how variables are constructed to examine the impact of trade on wages and followed with the classification of industries. Fifth section presents the empirical estimation and the chapter ends with a summary and concluding remarks.

3.2 Analytical Framework

There is quite a lot of literature on how market power leads to higher wages. The thinking underlying this is quite straightforward. Market power generates higher rents and these may be captured by employees in the form of higher wages (Nickell, 1999). The other reasons given for the concentrated industries to do so are i) labor costs in concentrated industries can be more easily passed on to consumers ii) the small number of firms in concentrated industries makes it easier for unions

to organize and raise wages (Long and Link, 1983) iii) the life of managers will be more comfortable and iv) it allows firms to avoid productivity falls as a result worker feeling unfairly treated. This argument is also reflected in the literature which gives a positive relation between profit of the industry and wages (Christofides and Oswald, 1992: Blanchflower et al, 1996). But when trade opens more imports as well as export takes place. More imports means fall in profits of domestic industries due to more competition from foreign industries and therefore fall in wages in those industries whereas increase in export leads to increase in profits and therefore more wages in those industries. Revenga, 1992 suggest that increase in import competition reduces wages. Other analysis finds no evidence in the data for such a negative link (Lawrence and Slaughter, 1993). So the empirical evidence on the impact of trade on wages is controversial. Yet another paper argues that change in wages depends upon the market structure of the industries that is penetrated by trade (Martins, 1994). Imports happen only when foreign firms believe that they can sell their product in domestic market at lower price and still earn profits. Suppose import penetration occurs in a concentrated domestic industry. This will affect the profits of the domestic industry adversely. But if the import penetration happens in a competitive domestic industry, it will not affect the profits of the domestic industry that much as in a concentrated domestic industry. This implies that the negative impact of wages will be stronger if import penetration happens in concentrated industry rather than a competitive domestic industry. Conversely exports have a more positive impact on wages.

3.3 Econometric Model

We use panel data regression method to examine the effect of trade on wages. In this model the dependent variable is wage. As we do not have secondary source on individual wage rate of employees in organized manufacturing industries, we found wage rate by taking the ratio of total emoluments⁴ to total persons engaged⁵ in an

⁴ Total Emoluments is defined as the sum of wages and salaries, employers' contribution as provident fund and other funds and workmen and staff welfare expenses.

industry. Wage rate is used in real terms by deflating it with Consumer Price Index for Industrial Workers (CPIIW) with base 2000.

The set of variables of our interest is import penetration ratio (MP), export intensity (XI) and Herfindahl index (HI) which is used to indicate market structure.

As the previous empirical evidence suggest the relationship between concentration and wages is mixed (Landon, 1970; Long and Link, 1983; Nickell et. al., 1994; Blachflower and Machin, 1996). So here we are expecting mixed results. When import penetration increases there will fall in profits of the domestic industry. Therefore a fall in wages in those industries is expected. In the same line a rise in export intensity leads to an increase in profits of the domestic industry. Therefore a rise in wages in those industries is expected.

Wages can be affected by many factors other than trade variables and market structure. The factors that could affect wages can be the technological change, labour market rigidities and macroeconomic changes. Therefore to capture the multidimensionality of the openness of trade requires careful control for the non-traded factors to isolate the impact of trade on wages. By surveying the existing studies, many industry specific variables are identified in order to control the other factors.

Productivity of the employee affects the wage he gets i.e. when labour productivity increases the industry is expected to pay more wage. Labour productivity is measured in gross value added per worker.

⁵ Total Persons Engaged include all workers receiving wages and holding clerical or supervisory or managerial positions engaged in administrative office, and all working proprietors and their family members who are actively engaged in the work of the factory

Goldar (2000) argued that in the liberalized trade regime, due to increased competition industrial firms may try to save cost and become more competitive by imported technology and imported capital goods. This may lead to increased capital intensity of production. It can also be argued that in the era of competition the industry may offer more wages to productive workers i.e. if technology is embodied in physical capital then a positive relation between wages and capital labour ratio can be expected. This suggests that the increase in capital- labour ratio of an industry may have a positive effect on wages.

After holding constant productivity and other relevant variables, size is expected to have has a significant positive effect on wages. This can be due to the following reasons i) they achieve scale economies ii) hire higher quality workers (Kwoka, 1983) iii) give more wages to forestall unionization iv) have more ability to pay high wages. This is observed in many countries by Brown and Medoff (1989).

Nickell and Wadhvani (1990) and Blachflower et.al.(1990) suggests that the profit effect of pay levels are not minor. The profits of the present industry can affect the employees mainly in two ways. On the on hand the industry may increase the wages of the employees or they may increase the employment in the next year. If profits are used in the second way, then wages may remain stagnant. Christofides et al (1992) shows that real wages depend positively upon the level of lagged profitability.

In India it is believed that the increase in wage is due to growing rigidities in labor market or growing strength of the trade unions (Nagaraj, 1994). This increases the cost of labour. Revenga (1997) finds that workers are keen to trade off wages to preserve jobs. Alternatively, they may prefer to maintain high levels of wages for those who remain employed, at the expense of those who lost their jobs. Hence strength of trade unions is important in wage settlement. So a positive relation is expected of union power and wages.

Some independent variables may interact with each other to affect wages. Exports from a concentrated industry lead to more profits than exports from a competitive industry. Therefore wages will be higher in concentrated industry than in a competitive industry.

Thus a positive relation is expected between the interaction between concentration and export with wages. If import takes place in a concentrated industry this may affect wages more than import in a competitive industry. Thus a negative relation is expected between the interaction between concentration and import with wages. For taking the above into account interactive terms are included in the model. Thus the panel regression model for the i^{th} industry in the t^{th} year is given below.

$$W_{it} = a_{it} + \beta_1.HI_{it} + \beta_2.XI_{it} + \beta_3.MP_{it} + \beta_4.VAW_{it} + \beta_5.K/L_{it} + \beta_6.S_{it} + \beta_7.P_{it} + \beta_8.HI_{it}.XI_{it} + \beta_9.HI_{it}.MP_{it} + u_{it}$$

where W= Real emoluments per total persons engaged (wage rate)

HI= Herfindahl Index

XI= Export Intensity

MP= Import Penetration

VAW= Real Value Added per employee

K/L= Capital- labour Ratio.

S=Firm Size

P= Profits per employee

U = Mandays lost per employee

u_{it} = random error

3.4 Data

No single data source exists for the Indian economy that provides data required by this study. Therefore study draws data from different sources, i.e. the Annual Survey of Industries (ASI), which is published by Central Statistical Organisation,

Government of India, Commodity Trade (COMTRADE) provided by United Nations Conference on Trade and Development (UNCTAD), Prowess, Centre for Monitoring Indian Economy Pvt. Ltd (CMIE) and Indian Labour Statistics by the Ministry of Labour. ASI provides a reasonably comprehensive and reliable disaggregated estimate for the manufacturing industries. It covers all the production units registered under the Factories Act, 1948⁶. CMIE database contains data on over 9000 registered companies. COMTRADE data contains exports and imports from India. Present analysis is based on 3-digit industry classification which follows NIC-98. In order to capture the effects of trade reforms on wages the period of study is taken from 1991-92 to 2006-07, the last year up to which ASI is available. The study period is selected according to the availability of the data. Thus the estimation is made for the panel for the period 1991-92 to 2006-07. The data comprises of 51 three-digit manufacturing industries consisting of 816 observations. The other specificities of data used in the study are explained with the construction of each variable. The study uses STATA 10.0 statistical package for the analysis and estimation.

3.5 Measurement of Variables

In the following section we will explain the construction of variables.

Import penetration ratio

When a country liberalises, it has to face international competition. Import is one of the channels through which trade generates competition in domestic market. Therefore it is important to measure the effect of import penetration on wages in manufacturing sector. Sen (2008) pointed out that import penetration ratio (MP) is a measure which helps to evaluate the import competition. Another important utility of this measure is that it separates the effects of import competition from export orientation Hence this study uses import penetration ratio for measuring the effect of imports on wages in manufacturing sector. Import penetration ratio for an

⁶ The factories Act, applies to those units employing 10 or more workers and using power and 20 or more workers not using power.

industry is defined by Sen (2008) as the ratio of imports to the domestic availability. Domestic availability is defined as production plus imports minus exports.

$$MP = M_i / (Q_i + M_i - X_i)$$

where, Q= Gross output

M= Imports

X=Exports

UNCTAD provides data on imports in US dollar terms according to calendar year. Nevertheless ASI data is in Rupee terms according to the financial year. Therefore to make the data consistent, first we convert US dollar into rupee term using the exchange rate reported in Handbook on Indian Economy by RBI. Secondly, the study converts calendar year into financial year in the following way, we have to take the average of 12 months of exports and imports and then multiply by 3 for taking care of the financial year ending months and deduct this amount from the current year and add it to the previous year. The basic assumption followed in this procedure is that export and import are constant for all months. However, this assumption is not appropriate for obtaining consistent results with the financial year.

Export Intensity

Wood (1991) argued that the import penetration ratio is one sided measure. It neglects the gain in wages by increased exports to other countries. Hence it is important to include export intensity (XI) in the model in order to observe the effect of export orientation on wages. Increased exports is expected to have a positive effect on profits of industry thereby a positive effect on wages. Export intensity is defined as ratio of exports to domestic production.

$$XI = X_i / Q_i$$

UNCTAD provides data on exports in US dollar terms according to calendar year. Same procedures as that of imports are followed here to convert exports to rupee terms as well as for converting calendar year to financial year.

Herfindahl Index

For measuring the market structure, numerous measures are available. They are basically divided into static and dynamic measures (Pushpangadan and Shanta, 2009). Here dynamic measures of competition are not used because it is complex and data is not available for its calculation. Instead we use a static measure. The common static measures of competition are concentration ratio and herfindahl index. The concentration ratio is the percentage of market share owned by the largest m firms in an industry, where m is a specified number of firms, often 4 or 8. The concentration ratio can be expressed as:

$$CR_m = s_1 + s_2 + s_3 + \dots + s_m$$

where, CR_m = Concentration Ratio

s_i = market share of the i^{th} firm

The concentration ratio ignores the inequalities within the leading group of firms and emphasizes only on the inequalities between leading and all other firms. That is for calculating concentration ratio we need data for all firms in an industry. The Herfindahl index uses the market shares of all the firms in the industry, and these market shares are squared in the calculation to place more weight on the larger firms. Hart (1975) has suggested that Herfindahl index is sensitive to firm numbers. As we have only CMIE database which gives data for sample of firms in an industry, it is better to use Herfindahl index to represent market structure as it has sample properties. If there are n firms in the industry, the HI can be expressed as:

$$HI = s_1^2 + s_2^2 + s_3^2 + \dots + s_n^2$$

where, HI= Herfindahl Index

s_n = the market share of the nth firm.

n= total number of firms

Value added per employee

Productivity of the employee affects the wages he gets i.e. when labour productivity increase, the industry is supposed to pay more wages. There are single deflation method and double deflation method to find productivity (Balakrishnan and Pushpangadan, 1994). A single indicator method of deflation is a means of estimating the value added directly using only one time series as an indicator (e.g. deflated value added) instead of double deflation. Double deflation is a method whereby gross value added is measured at constant prices by subtracting intermediate consumption at constant prices from output at constant prices; this method is feasible only for constant price estimates which are additive. In this we use single deflation method.

Capital-Labour Ratio

For the measurement of capital intensity the ratio of real fixed capital⁷ to labour is calculated. Capital stock is deflated using Wholesale Price Index (WPI) with 1994-95 base. As WPI is not available in the 3-digit level, the WPI is calculated at the disaggregated level by concurring the products in each industry groups with the WPI of the products given from the Office of Economic Advisor, Ministry of Commerce and Industry.

⁷ Fixed Capital represents the depreciated value of fixed assets owned by the factory as on the closing day of the accounting year. Fixed assets are those that have a normal productive life of more than one year. Fixed capital includes land including lease- hold land, buildings, plant & machinery, furniture and fixtures, transport equipment, water system and roadways and other fixed assets such as hospitals, schools, etc. used for the benefit of the factory personnel.

Industry Size

Industry size is measured as employment per industry and is therefore directly related to the level and structure of employment.

Profits

The profits of the present industry can affect the employees wage in the next year. So to negate for this effect, we control for lagged profits per employment.

Mandays lost per employee

Lucas (1988) advocates that in a wage fixation, power of unions is reflected in increased number of mandays lost due to industrial disputes. Therefore this study uses mandays lost due to industrial disputes as proxy for the strength of trade unions. Industrial disputes include temporary stoppage of work by the group or all the employees of an establishment (strike) to press the demand. In addition, temporary withholding of work from a group of employees by an employer (lockout) in a unit, in connection with matters relating to employment or unemployment or terms and conditions of employment is taken as an industrial dispute (Indian Labour Statistics, Labour Bureau, GOI, Ministry of Labour). The industrial disputes and mandays lost have been taken from various issues⁸ of Indian Labour Statistics brought out by Labour Bureau at the three-digit level. The variable has been computed by dividing the mandays lost due to industrial disputes by the total number of employees.

3.6 Classification of industries

In the model firstly, we are classifying industries into import competing and export oriented industries. Then we are dividing industries according to technology used in the industries. The reasons behind this classification are given below.

⁸ Indian Labour Statistics 1991-93,1994,1995,1996, 1997,1998 &1999,2000-03, 2004, 2005,2006

i) Import competing and export oriented industries

Gaston and Trefler (1994) in their study show that workers in import competing industries earn lower wages than workers in export oriented industries. This means that wage effect of trade is greater in import competing industries than export oriented industries. This is one of the reasons for classification. For classifying industries into export oriented and import competing we employ the method used by Ghose (2000). For classification scheme see Appendix 3.2. After classifying the industries, the growth rate of real wage (Table 3.1) shows that there is not much change in the growth rate of real wage between 1981-82 to 1990-91 and 1991-92 to 2007-08 for industries together. But with respect to import competing industries there is decrease in growth rate of real wage from 3.19 percent to 2.76 percent and for export oriented industries there is an increase from 1.52 percent to 2.63 percent in the same period.

Table 3.1 Growth Rate of Real Wage

Growth Rate	All Industries	Import competing industries	Export Oriented Industries
1981-82 to 1990-91	2.61	3.19	1.52
1991-92 to 2007-08	2.63	2.76	2.63
1981-82 to 2007-08	2.62	2.92	2.17

Source: ASI database

As import competing industries and export oriented industries are showing different growth rate of real wages we are classifying the industries into export oriented and import competing industries. This will capture its differential impact on wages.

ii) Technology intensive and low technology industries

Employees working with more and better machines produce more, but they also need to be more skilled if they are to work with more and better machines. As skill of a person is directly linked with the education of that person, a positive relation is

expected of skill and education. Empirical studies by Feliciano (2001) and Heywood (1991) tells us that there is a positive and significant relation between education and wage. Skilled persons are more needed in technology intensive industry rather than a low technology industry. Therefore we further classify the industries according to technological intensity. However, classifying industries on the basis of their technological intensity is a quite difficult task because no single objective criterion is available for this purpose and hence any classification involves some amount of arbitrariness. Therefore, the present study follows previous studies (Connolly,2003; Hasan, 2002 and Parameswaran, 2007) which classify industries into technology intensive and low technology industries. This classification scheme is given in Appendix Table 3.3

3.7 Empirical Results

3.7.1 Estimation

The model is first estimated for all 51 industry groups together with and without mandays lost due to industrial disputes per employee i.e. with and without the trade union effect. This is because the Indian Labour Statistics do not give data on industry with less the 500 mandays lost due to industrial disputes. So by assuming that industry with less the 500 mandays lost due to industrial disputes as insignificant, we take its value as 0. The other reason for doing so is that only 4.2 percent of the 816 observation on mandays lost due to industrial disputes has missing values. The model is again estimated for import competing and export oriented industries Model is further estimated for technology intensive and low technology industries in import competing and export oriented industries.

Before presenting the results, the following summary variables are presented.

Table 3.2 Summary Statistics of Variables Used

Variables	Mean	Minimum	Maximum
Herfindahl Index	0.182	0.009	1
Export Intensity	0.277	0.002	5.076
Import Penetration	0.165	-3.58	1.87
VAW	2508.83	268.33	32410.8
Capital- labour ratio	3973.62	65.86	50322.33
Firm Size	152715.6	3046	1356146
Profits per employee	761.53	-4404.76	19693.85
Mandays lost per employess	1.968	0	106.63

Source: ASI, CMIE and WITS database

Note: No. of observations = 816

3.7.2 Results

The present study uses the panel data regression analysis. To know whether to use fixed effect model (FEM) or random effect model (REM) should be used for panel data regression Hausman Specification test is conducted. The test yields statistically significant result ($\chi^2=170.55$) which indicates that fixed effect model is consistent (Baltagi, 1995). Therefore, here after we are interpreting the fixed effect results.

Table 3.3 Wage Equation (All Industries)

Dependent Variable: Wage

Variables	Fixed Effect Model	
	Constant	717.52* (4.64)
Herfindahl Index	-220.13*** (-3.54)	-223.59*** (-3.59)
Export Intensity	28.50 (0.45)	28.43 (0.75)
Import Penetration	-60.20 (-1.70)	-62.38 (-1.76)
Value added per worker	0.261*** (7.21)	0.026*** (7.19)
Capital Labour Ratio	0.024*** (11.97)	0.024*** (11.91)
Industry Size	0.0003** (3.14)	0.0004*** (3.29)
Profits/employment	0.002 (0.43)	0.002 (0.43)
Mandays lost per employee	-	-1.04 (-1.04)
Herfindahl Index* Export Intensity	186.49* (2.21)	187.46** (2.22)
Herfindahl Index* Import Penetration	-482.66* (-3.07)	-487.32** (-3.10)
R ²	0.45	0.46
No. of observations	816	

Source: Same as Table 3.2

Note: t-values are given in the parentheses

*** 1% level of significance, ** 5% level of significance, * 10% level of significance

Results arrived based on the fixed effect panel regression confirms the following observations (Table 3.3). All the coefficients signs, except lagged profits per employee are as expected. Even though coefficient of export intensity and import

penetration has the expected sign, they are not statistically significant. This may be due to the fact that all the industries are taken together for analysis. The negative sign of the market structure implies a significant negative relationship between market structure and wages. Value added per employee has significant positive effects on wage. As expected earlier, capital-labour ratio has a statistically significant positive sign. The positive significant coefficient of industry size shows that there is positive relation between industry size represented by employment per industry and wage. The insignificant coefficient of lagged profits per employee do not support the argument that profits of the present are used for paying wages in the next year. So far, we presented the panel regression results without mandays lost per employee

However the model with mandays lost per employee did not change the result. While market structure shows statistically significant negative result, import penetration ratio show a negative effect on wages which is not statistically significant. Export intensity shows a positive insignificant result on wages. Other control variables show expected signs. Even though mandays lost per employee do show a negative sign, it is not statistically significant. This may be due to inadequacy of data or it may be due to decline in the importance of trade unions in wage bargaining after trade liberalization which is reflected in studies of (Sharma, 2006 and Bhandari and Heshmati, 2005).

The interactive terms used in the analysis also shows the expected result. The interaction between market structure and export intensity has a positive significant effect on wages whereas market structure and import penetration has negative significant effect on wages. The regression result for all industries did not show a statistically significant positive sign for export intensity and negative sign for import penetration. Further we are analyzing the effect of trade on wages in import competing industries and export oriented industries.

Table 3.4: Wage Equation (import competing industries)

Dependent Variable: Wage

Variables	Fixed Effect Model	
	Constant	979.04* (3.13)
Herfindahl Index	-385.51* (-2.68)	-387.63* (-2.67)
Export Intensity	458.33** (3.17)	461.11** (3.15)
Import Penetration	-402.65** (-3.18)	-406.37*** (-3.11)
Value added per worker	0.022*** (4.72)	0.023*** (4.69)
Capital Labour Ratio	0.023*** (8.85)	0.023*** (8.81)
Industry Size	0.0009*** (3.31)	0.001*** (3.31)
Profits/employment	-0.0009 (-0.13)	-0.0009 (-0.13)
Mandays lost per employee	-	-0.475 (-0.12)
Herfindahl Index* Export Intensity	717.95*** (3.85)	720.72*** (3.83)
Herfindahl Index* Import Penetration	-989.27 (-3.32)	-993.31*** (-3.31)
R ²	0.44	0.45
No of observations	368	

Source: Same as Table 3.2

Note: Figures in the parentheses are t-values

*** 1% level of significance, ** 5% level of significance, * 10% level of significance

Followed by Table 3.3 in Table 3.4 also we are interpreting the fixed effect results. Thus the estimated fixed effect model indicates that the export intensity coefficient has a significant positive effect on wage. The negative significant sign of the import penetration implies that there is negative relation between import penetration and industry wages. This shows that in an import competing industry also export orientation affects significantly though the magnitude is relatively less. This may be due to disaggregation of overall production function, by importing the semi-finished and unassembled products after liberalization to finished and assembled in the home country and exports will increase the wages in the industry. Here also market structure shows a significant negative result. Other control variables and interaction variables are showing the same result as before except profits per employee. But here also it is not statistically significant.

Table 3.5: Wage equation (export oriented industries)

Dependent Variable: Wage

Variables	Random Effect Model	
	Constant	485.29* (5.34)
Herfindahl Index	-115.82 (-1.62)	-121.10* (-2.01)
Export Intensity	27.91* (2.01)	27.75* (2.93)
Import Penetration	-72.42 (-1.97)	-75.05** (-2.05)
Value added per worker	0.051*** (6.48)	0.051*** (6.56)
Capital Labour Ratio	0.396*** (9.20)	0.39*** (9.14)
Industry Size	0.00002 (2.28)	0.00004 (2.12)
Profits/employment	0.02 (1.01)	0.019 (1.89)
Mandays lost per employee		-1.086 (-1.50)
Herfindahl Index* Export Intensity	73.67 (0.63)	72.512 (0.62)
Herfindahl Index* Import Penetration	-497.56** (-2.06)	-508.39** (-2.11)
R ²	61	62
No of observations	288	

Source: Same as Table 3.2

Note: z-values are given in the parentheses

*** 1% level of significance, ** 5% level of significance, * 10% level of significance

For estimating the effect of trade on wages on export oriented industries we use random effect model after conducting the Hausman Specification Test. The results are given in Table 3.5.

The estimated random effect model without mandays lost per employee indicates that the export intensity coefficient has a significant positive effect on industry wages. Even though the sign of import penetration is negative it is not statistically significant. Here also the relation between market structure and wages is showing a negative sign but it is not statistically significant. All other control variable behaves as before.

The model with mandays lost per employee shows a slightly different result. The market structure and import penetration ratio shows negative and statistically significant sign whereas export intensity shows a statistically significant positive result. There is no change in sign of other variables.

To check whether skill of employees has an effect on wage, we are classifying industries according to technological intensity.

Table 3.6 Wage Equations for High and Low Technology (all industries)

Dependent Variable: Wage

Fixed Effect Model				
Variables	High technology		Low technology	
Constant	940.23* (5.11)	989.34* (5.02)	899.04* (5.03)	775.61* (4.97)
Herfindahl Index	-423.68** (-2.76)	-418.63** (-3.01)	-1109.14 (-1.27)	-1365.19 (-1.58)
Export Intensity	327.83* (2.11)	334.41* (2.02)	694.54 (1.25)	1145.23 (1.39)
Import Penetration	-343.59* (-2.27)	-371.34* (-2.47)	114.32 (0.31)	141.76 (0.29)
Value added per worker	0.022*** (3.97)	0.023*** (4.01)	0.0002* (2.13)	0.0004* (2.01)
Capital Labour Ratio	0.023*** (6.38)	0.026*** (6.27)	0.024*** (5.35)	0.027*** (5.53)
Industry Size	0.001** (3.01)	0.002** (3.12)	0.0003 (0.68)	0.0003 (0.03)
Profits/employment	0.0282* (2.13)	0.013* (2.09)	-0.0003 (-0.02)	0.006 (0.21)
Mandays lost per employee	-	-2.59 (-0.47)	-	-37.45 (-1.16)
Herfindahl Index* Export Intensity	543.56** (2.58)	551.18** (2.73)	12382.5** (2.84)	869.15* (2.49)
Herfindahl Index* Import Penetration	-953.62** (-3.13)	-959.31** (-3.21)	-2338.09 (-1.23)	-514.39 (-0.25)
R ²	0.45	0.47	0.70	0.71
No of observations	448		358	

Source: Same as Table 3.2

Note: Figures in the parentheses are t-values

*** 1% level of significance, ** 5% level of significance, * 10% level of significance

Table 3.6 shows that the result for the high technology is same as that of export oriented industries. The only difference is that, here in high technology industries the relation between profits per employee and wage is showing statistically significant positive sign as we envisaged.

For low technology industries the relation between market structure, export intensity, import penetration are as before. But all are statistically insignificant. All other variables are showing same results as before. Here all the control variables except value added per worker and capital-labour ratio are statistically insignificant.

Here the main difference seen between high technology and low technology industries is that in high technology industries profits in the current year are shared with the employees in the next year. This is not seen in import competing low technology industries. It can also mean that those industries with skilled employees, the employers are sharing the profits. In high technology industries, industry size seems to have a significant positive effect on wages which is not observed in low technology industries. The interaction variables are also showing same results as before.

Table 3.7: Wage Equations for High and Low Technology Industries (import competing industries)

Dependent Variable: Wage

Fixed Effect Model				
Variables	High technology		Low technology	
Constant	993.33* (5.27)	1004.34* (6.02)	902.04* (6.06)	746.63* (4.57)
Herfindahl Index	-416.57** (-2.89)	-428.66** (-2.95)	-1019.13 (-1.16)	-1468.25 (-1.67)
Export Intensity	319.84* (2.01)	333.32* (2.02)	706.34 (1.05)	1039.26 (1.53)
Import Penetration	-333.99* (-2.17)	-352.32* (-2.26)	123.25 (0.31)	129.89 (0.33)
Value added per worker	0.024*** (4.07)	0.023*** (3.99)	0.0004* (2.05)	0.0001* (2.02)
Capital Labour Ratio	0.026*** (6.40)	0.026*** (6.36)	0.02*** (5.14)	0.022*** (5.58)
Industry Size	0.001** (3.02)	0.001** (3.05)	0.0005 (0.79)	0.0001 (0.13)
Profits/employment	0.0192* (2.02)	0.019* (2.03)	-0.0004 (-0.03)	0.001 (0.12)
Mandays lost per employee	-	-2.62 (-0.67)	-	-34.45 (-1.07)
Herfindahl Index* Export Intensity	556.43** (2.77)	571.27** (2.82)	12427.7** (2.91)	9777.17* (2.24)
Herfindahl Index* Import Penetration	-945.27** (-3.07)	-967.27** (-3.12)	-2318.16 (-1.09)	-526.47 (-0.23)
R ²	0.44	0.46	0.69	0.71
No. of observations	288		80	

Source: Same as Table 3.2

Note: Figures in the parentheses are t-values

*** 1% level of significance, ** 5% level of significance, * 10% level of significance

Table 3.7 shows that the result for the import competing technology intensive and low technology industries are the same as that of all industries which are technologically classified. Here also in importing competing high technology industries the relation between profits per employee and wage is showing statistically significant positive sign as we expected. This means that in these industries profits in the current year are shared with the employees in the next year which is not seen in import competing low technology industries. It can also mean that those industries with skilled employees the profits are shared with employees. Here also in high technology industries, industry size has a positive effect on wages which is not seen in low technology industries. All other control variables and interaction variables are showing the same results as above.

Table 3.8: Wage Equations for High and Low Technology Industries (export oriented industries)

Dependent Variable: Wage

Random Effect Model				
Variables	High technology		Low technology	
Constant	366.77* (5.96)	367.71* (5.65)	181.87* (6.33)	181.55* (6.26)
Herfindahl Index	767.74** (3.20)	588.09* (2.03)	629.75 (1.84)	629.76 (1.37)
Export Intensity	589.02* (2.10)	588.09* (2.08)	109.69** (5.38)	109.72** (5.36)
Import Penetration	-480.65* (-2.07)	-481.65 (-1.69)	-54.19* (-2.15)	-54.179* (-2.14)
Value added per worker	0.033* (1.99)	0.033* (1.98)	0.165** (6.00)	0.165** (5.97)
Capital Labour Ratio	0.059*** (7.22)	0.059*** (6.99)	0.021** (2.40)	0.0213** (2.38)
Industry Size	0.054** (2.60)	0.00057** (2.45)	0.00007** (2.73)	0.00008** (2.70)
Profits/employment	0.054** (2.55)	0.054** (2.53)	-0.155** (-3.65)	-0.155** (-3.62)
Mandays lost per employee	-	-0.1172 (-0.05)	-	0.099 (0.41)
Herfindahl Index* Export Intensity	4243.82** (3.06)	4239.65** (3.03)	651.24** (5.94)	652.65** (5.92)
Herfindahl Index* Import Penetration	-2058.56* (-5.96)	-2068.39 (-1.94)	-326.21 (-1.01)	-329.79 (-1.01)
R ²	0.73	0.74	0.52	0.53
No of observations	112		176	

Source: Same as Table 3.2

Note: Figures in the parentheses are z-values

*** 1% level of significance, ** 5% level of significance, * 10% level of significance

The results for export oriented technology intensive industries in Table 3.8 show a different pattern. Here the relation between market structure and wages shows a statistically significant and positive result quite unlike the previous results where it shows a negative relation. This may mean that if the export happens in technology intensive industry which has some market power, the employees are paid more. This is not seen for export oriented low technology industries. Here also like import competing high technology industries the relation between profits per employee and wages is positive and statistically significant. This reaffirms the point that profits are shared in technology intensive industries where employees are skilled. All other variables are showing similar results.

3.8 Summary and Findings

This chapter presents an econometric analysis of the impact of trade on wages. The period of analysis is between 1991-92 and 2006-07. This chapter draws data from Annual Survey of Industries (ASI), COMTRADE, Centre for Monitoring Indian Economy (CMIE) and Indian Labour Statistics. The framework for the analysis is as follows. Monopoly in market leads to more wages. But when trade opens, more exports as well as imports take place. Exports leads to rise in wages and imports lead to fall in wages in those industries. The explanatory variables used in this analysis are herfindahl index, export intensity and import penetration controlling for other industry specific variables like value added per worker, factory size, capital-labour ratio, lagged profits per employee and mandays lost per employee. The empirical results are shown with and without mandays per employee. Table 3.9 shows the summary for model with mandays per employee.

Table 3.9: Summary of Findings

Variables	Wage								
	All industries	Import Competing Industries	Export Oriented Industries	Technologically classified					
				All Industries		Import Competing Industries		Export Oriented Industries	
				High	Low	High	Low	High	Low
Market Structure	-ve Significant	-ve significant	-ve significant	-ve significant	-ve not significant	-ve significant	-ve not significant	+ve significant	+ve not significant
Export Intensity	+ve not significant	+ve significant	+ve significant	+ve significant	+ve not significant	+ve significant	+ve not significant	+ve significant	+ve not significant
Import Penetration	-ve not significant	-ve significant	-ve significant	-ve significant	-ve not significant	-ve significant	-ve not significant	-ve significant	-ve not significant

To summarise the relationship between market structure and wage, a negative relation is seen in all categories of the industries except export oriented technologically classified industries (Table 3.9). These coincide with the studies of Landon (1970). But both negative and positive relations are not statistically significant in the case of low technology industries. This shown in studies of Nickell et. al. (1994) and Blanchflower and Machin (1996). This means that if exports happen in technology intensive industry with some market power, the employees are paid more. Thus in this study we are getting a mixed result on effect of market structure on wage.

While analysing the relationship between export intensity and wage a positive relation is noticed for all categories of industries. But the results are not statistically significant for industries as a whole and low technology categories. In the relation between import penetration and wage the results are same as that of relation between export intensity and wage.

All control variables are showing the a priori relation except lagged profits per employee. In import competing and export oriented technology intensive industries only the lagged profits per employee are showing a statistically significant and positive result. This shows that in a technology intensive industry where skilled employees are employed, the profits of the current year are shared as wage with employees.

Another important observation is that the adverse wage effect of imports in a concentrated industry is greater than the wage effect of imports in a competitive domestic industry. For exports, wage effect is greater in concentrated industries than in competitive domestic industry.

Chapter 4

Conclusions

The Government of India embarked on drastic economic reform in 1991 after a phase of gradual deregulation during the 1980s. Despite considerable debate concerning the possible impact of economic reforms on Indian economy, little empirical work has been undertaken on the effects of liberalization on industry wages in India.

The basic frame of analysis is that market power leads to higher wages. When trade opens, promotion of imports as well as exports occurs. More imports means fall in profits of domestic industries which were previously captured by the industry due to market power. This will lead to fall in wages in those industries. Increase in export leads to increase in profits as there is imperfect competition in the international market and therefore more wages in those industries. But the empirical result for the relation between trade and wages is controversial. To resolve this controversy Martins (1994) in his paper argued that wages depend upon the market structure of the industries penetrated by trade. This is because the negative impact on wages will be stronger if import penetration happens in concentrated industry rather than in a competitive domestic industry. Conversely exports have a more positive impact on wages.

The present study is confined to organized manufacturing industries, which is employing only 8 percent of the total work force. The period of analysis for the study is 1991-92 to 2006-07. The study is conducted with the following objective ie to know impact of trade on industry wages. The study draws data from various data sources. The basic data sources used are Annual Survey of Industries (ASI), COMTRADE, Centre for Monitoring Indian Economy (CMIE) and Indian Labour Statistics.

Chapter two gives an overview of industrial and trade reforms during the structural reforms of 1991. These reforms have led to marked decline in tariffs rates and NTBs which resulted in increased openness of the Indian economy. When we look into the measure of openness to trade i.e. trade share in GDP we found that it has been increasing since 1991-92. When we look into the trend in market structure, we see that herfindahl index is showing a declining trend. This means that there is an increase in competition. This gives the insight that Indian industries are becoming more competitive after the trade liberalization. Labour market reforms were also envisaged as part of structural reforms. But lack of political consensus and numerous laws like Minimum wages, Industrial Disputes Act created rigidities in organized labour market. To cope with the external competition, the market has made several survival strategies. This has led to the decline in strikes which shows that there is a decline in trade union power. Thus it can be argued that the Indian labour market is rigid in appearance but flexible in function. When we look into the profits and wages of industries after the reform period, we find that the share of total emoluments in value added is on the decline and share of profits in value added is on the rise. We also found that when profits per employee increased 21 times between 1991-92 and 2007-08, the wages per employee 4 times only. This gives an indication that there is positive relation between profits and wages in organized manufacturing industry. The bivariate analysis on the relationship between export and wage is positive and import and wage is negative and market structure and wage gives a negative result. This is in line with the empirical evidence. But all the relationships are found to be statistically insignificant. To find whether these relations hold well, multivariate analysis is taken up.

The third chapter uses panel data regression technique to find the impact of trade on wages. The explanatory variables used in this analysis are herfindahl index, export intensity and import penetration controlling for other industry specific variables like value added per worker, factory size, capital-labour ratio, lagged profits per employee and mandays lost per employee.

The relationship between market structure and wage, a negative relation is seen in all categories of the industries except export oriented technologically classified industries. But both negative and positive relations are not statistically significant in the case of low technology industries. This means that if exports happen in technology intensive industry with some market power, the employees are paid more. Thus in this study we are getting a mixed result on effect of market structure on wage.

While analysing the relationship between export intensity and wage a positive relation is noticed for all categories of industries. But the results are not statistically significant for industries as a whole and low technology categories. In the relation between import penetration and wage the results are same as that of relation between export intensity and wage.

So the results show that market structure has a significant impact on wages. The sign of the relation depends on the characteristic of industry. It is also seen that export intensity and import penetration have a significant positive and negative relation respectively as we envisaged. The results of this study are same as that of the results from developed countries.

All control variables are showing the a priori relation except lagged profits per employee. In import competing and export oriented technology intensive industries only the lagged profits per employee are showing a statistically significant and positive result. This shows that in a technology intensive industry where skilled employees are employed, the profits in the current year are shared with employees in the next year.

Another important observation is that the imports in a concentrated industry have more adverse impact on wage than imports in a competitive domestic industry. For

exports, wage effect is greater in concentrated industries than in competitive domestic industry.

From the above study we conclude that market structure is an important element in determination of wage. The adverse impact on wages is stronger for concentrated industries than in a competitive industry. From the point of view of employees, it is better to export from a concentrated domestic industry than a competitive industry as it has stronger positive impact on wages and it is also better to import in a competitive domestic industry than a concentrated industry as it has lesser negative impact on wages. It is also seen that profits are shared with employees only in technology intensive industries. This leads to the inference that in technology intensive industries the capital may be embodied on employees.

The present study can be used as the first step towards understanding the impact of trade on wages. However, deep roots and complex interlinkages of trade and wages call for a much detailed study.

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Appendixes

Appendix 1.1: Concordance table for NIC87 to NIC98 classification.

NIC 1998	NIC 1987
151	200+203+202+210+211+212
152	201
153	204+218+217
154	213+214+215+219+205+206+207+209
155	220+223+221+222+216+224
160	225+226+227+228+229
171	231+232+233+234+235+240+241+242+244+245+247 +250+251+252+253+254+255+256+236 +243+246+248+257+258+259
172	267+268+263+264+261+262+269
173	260
181	265+266+292+964
191	290+293+299
192	291+311
202	271+272+273+274+275+279
210	280+281+282+283
221	285+284+286+289
222	287+288
232	314+315+316
241	300+301+302
242	303+304+305+208+307+309
243	306
251	310+312
252	313
261	321
269	322+323+320+324+327+326+325+329
271	330+331+332
272	333+334+335+336+3338+339
281	340+341+352
289	344+345+343+346+349
291	356+391+354+359+393+397+399

292	350+390+357+392+351+353
293	355+364+388
300	358+367
311	360
312	395
313	361
314	362
315	363
319	369
321	368
322	365+396
323	366
331	380
332	381
333	382
341	373+374
351	370
352	371+372
353	377
359	375+376+378+379
361	276+277+342
369	383+384+386+385+387+389

Appendix Table 3.1: National Industrial Classification 1998 at three digit level of industry aggregation, India

NIC-98

Code	Industry Description
151	Production, processing and preservation of meat, fish, fruit vegetables, oils and fats
152	Manufacture of dairy products
153	Manufacture of grain mill products, starches and starch products, and prepared animal feeds
154	Manufacture of other food products
155	Manufacture of beverages
160	Manufacture of tobacco products
171	Spinning, weaving and finishing of textiles
172	Manufacture of other textiles
173	Manufacture of knitted and crocheted fabrics and articles
181	Manufacture of wearing apparel, except fur apparel
191	Tanning and dressing of leather, manufacture of luggage, handbags, saddlery and harness
192	Manufacture of footwear
202	Manufacture of products of wood, cork, straw and plaiting materials
210	Manufacture of paper and paper product
221	Publishing
222	Printing and service activities related to printing
232	Manufacture of refined petroleum products
241	Manufacture of basic chemicals
242	Manufacture of other chemical products
243	Manufacture of man-made fibers
251	Manufacture of rubber products

252	Manufacture of plastic products
261	Manufacture of glass and glass products
269	Manufacture of non-metallic mineral products n.e.c.
271	Manufacture of Basic Iron & Steel
272	Manufacture of basic precious and non-ferrous metals
281	Manufacture of structural metal products, tanks, reservoirs and steam generators
289	Manufacture of other fabricated metal products; metal working service activities
291	Manufacture of general purpose machinery
292	Manufacture of special purpose machinery
293	Manufacture of domestic appliances, n.e.c.
300	Manufacture of office, accounting and computing machinery
311	Manufacture of electric motors, generators and transformers
312	Manufacture of electricity distribution and control apparatus
313	Manufacture of insulated wire and cable
314	Manufacture of accumulators, primary cells and primary batteries
315	Manufacture of electric lamps and lighting equipment
319	Manufacture of other electrical equipment n.e.c.
321	Manufacture of electronic valves and tubes and other electronic components
322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods
331	Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes except optical instruments
332	Manufacture of optical instruments and photographic equipment
333	Manufacture of watches and clocks
341	Manufacture of motor vehicles

343	Manufacture of parts and accessories for motor vehicles and their engines
351	Building and repair of ships & boats
352	Manufacture of railway and tramway locomotives and rolling stock
353	Manufacture of aircraft and spacecraft
359	Manufacture of transport equipment n.e.c.
361	Manufacture of furniture
369	Manufacturing n.e.c.

Source: National Industrial Classification, 1998, CSO, MOSPI, Govt. of India

Appendix 3.2 Classification of export oriented and import competing industries

Export-oriented Industries

Spinning, weaving and finishing textile

Knitting mills

Manufacture of carpets and rugs

Manufacture of wearing apparel, except footwear

Tanneries and leather finishing

Manufacture of products of leather and leather substitutes, except footwear and wearing apparel

Manufacture of footwear, except vulcanized or moulded rubber or plastic footwear

Manufacture of furniture and fixtures, except primarily of metal

Manufacture of drugs and medicines

Manufacture of chemical products not elsewhere classified

Manufacture of cutlery, hand tools and general hardware

Manufacture of structural metal products

Manufacture of fabricated metal products except machinery and equipment not elsewhere

classified

Manufacture of jewellery and related articles

Manufacture of musical instruments

Manufacture of sporting and athletic goods

Import-competing Industries

Manufacture of pulp, paper and paperboard

Manufacture of basic industrial chemicals except fertilizers

Manufactures of fertilizers and pesticides

Manufacture of synthetic resins, plastic materials and man-made fibres except glass

Manufacture of engines and turbines

Manufacture of metal and wood working machinery

Manufacture of special industrial machinery and equipment except metal and wood working machinery

Manufacture of office, computing and accounting machinery

Machinery and equipment except electrical n.e.c.

Manufacture of electrical industrial machinery and apparatus

Manufacture of radio, television and communication equipment and apparatus

Manufacture of aircraft

Manufacture of professional and scientific, and measuring and controlling equipment, n.e.c.

Manufacture of photographic and optical goods

Appendix Table 3.3 Classification of Industries

	Technology Intensive Industries	Low Technology Industries
1	Chemicals, excluding drugs	Food, Beverages & Tobacco
2	Drugs and Medicine	Textiles, Apparel & Leather
3	Non electrical Machinery	Wood Products & Furniture
4	Electrical Machinery excl. Communication equipment	Paper, paper products & Printing
5	Radio, TV & Communication Equipment	Petroleum Refineries and Products
6	Office Accounting and Computing Machinery	Rubber & Plastic Products
7	Motor Vehicles	Non metallic Mineral Products
8	Other Transport Equipment	Basic metals - Iron & Steel
9	Professional goods and Scientific instruments.	Non ferrous Metals
10	Metal Products	