

# Is the Pattern of Wage Differentials Stable Over Time? A Cluster Analysis in Turkish

## Manufacturing Industry

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June 2005

### Abstract

*This paper presents empirical measurements of inter-industry hourly wage differentials in Turkish manufacturing industry. Applying cluster analysis to the path of deviation of sub-industry wage payments from the industry average, it attempts to highlight the pattern of these persistent inequalities between sub-industries during the export-led industrialization phase of Turkish economy. The degree of wage inequality among different sub-industries of the sector may hold the key to understanding the changes in industrial structure and the growing vulnerability of the economy to outside shocks. The results underscore the importance of reclassifying industrial data specific to the variable of analysis. Data reveal widening inter-industry wage differentials during the period, contrary to what is generally predicted by conventional theory. The paper concludes by providing possible sources of the observed pattern of wage differentials.*

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<sup>1</sup> I am grateful to Erol Taymaz and Yumiko Yamamoto for providing access to data used in this research. I would also thank Nilufer Cagatay, Korkut Erturk, Manuel Montes, Al Campbell, Erdogan Bakir, O. Kagan Parmaksiz, Benan Eres and Hande Keklik for their helpful comments on a previous draft of this paper.

## **1. Introduction**

One of the highly controversial debates in the literature has been the determination of wages. In particular, the existence of inter and intra-industry wage differentials is the major puzzling kernel of these discussions. Conventional theory, until recently, offered arguments against the evidence for wage differentials with the underlying assumptions of competitive labor and capital markets. In a perfectly competitive world, returns to factors of production are determined by behavioral choices (Hicks [1963]). Hence inequalities, as such, are affirmed to be either temporary anomalies or consequences of rational behavior (Becker [1964]). Later in the literature departures from perfect competitive market assumptions generated new theoretical explanations. Efficiency wage theory, internal labor markets, rent sharing models based on the extent of managerial altruism are some of the examples (Krueger and Summers [1987], Dickens and Katz [1987], Doeringer and Piore [1971], Akerlof and Yellen [1986]).

On the contrary, heterodox economists have repeatedly criticized conventional theorists for failing to discern the evidence for persistent inter and intra-industry wage differentials. They argue that institutional factors i.e. industrial concentration, unionization, policy changes, laws, norms and many other regularities in the economy usually induce permanent structural artifacts such as persistent wage differentials. The monopoly pricing of firms and segmented labor market theory are the most well-known explanations (Edwards [1979], Reich [1984], Gordon et al.[1982]). As opposed to conventional arguments, heterodox theories have considered wage inequalities as an inherent matter of fact. In other words, according to them, the existing nature of the economic system per se sustains and transforms certain systematic patterns of inter- and intra industry wage differentials (Botwinick [1993]).

Over the last thirty years, the integration of the world economy shifted the earlier debates towards changes in the world division of labor and its impacts on income distribution, in general, and on the wage structure, in particular. Persistent inequalities within countries could no longer be analyzed separately from differential levels of economic development between nations. Alternatively, the main question explored became the impacts of increased trade/openness on the wage structure in advanced/developing economies<sup>2</sup> (Katz and Summers [1989], Wood (1995, 1997)). The issue has become much more complicated. Conventional trade theory suggests that increased trade reduces wage inequalities in developing countries. In its simplest form, the Heckscher-Ohlin theory argues that countries export the commodities which use abundant factors intensively, increasing the demand for the abundant factor. In developing countries since the abundant factor is ‘unskilled’ labor, higher exports of the sectors employing ‘unskilled’ labor brings higher demand for this labor reducing the wage disparities between ‘skilled’ and ‘unskilled’ labor. Simultaneously, in advanced countries the theory predicts the opposite. The real world evidence does not confirm the predictions of these early theoretical attempts in conventional theory. While the studies on advanced countries started to explore the question: ‘Are your wages set in Beijing?’(Freeman [1995]), many studies in developing countries have confirmed that in contrast to the standard prediction, wage inequality has increased.

### **1.1. Turkish Economy and Earlier Evidence on Wage Differentials**

The political and economic history of Turkey shares similarities with some of the Latin American and East Asian developing nations. The extent and the content of these similarities

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<sup>2</sup> Krueger and Summers [1987] report finding long-run stability both in US labor market and in several other countries. Hence, accordingly, any type of structural changes led by policy shifts would not affect the pervasive wage structure through time and among countries. Arbache, Dickerson and Green (2001) produces the same results for Brazil. On the other hand, Wood (1995) and Wood (1997) argue that in Latin America since the mid-1980s increased openness has widened wage differentials, discussing the issue as the wage inequality between skilled and unskilled labor.

differ. Starting in 1980s, along with many other developing countries in Latin America and Africa, Turkey took up the big-bang liberalization<sup>3</sup> (Akyuz [2005:2]). This was seen the solution to serious budget and debt difficulties. Unlike in Latin American countries, in Turkey, the state played a big role not only in implementing the stabilization and adjustment programs supported by the Bretton Woods Institutions (BWI), but also in converting the existing industrial strategies into export-oriented ones. This latter is similar to the managed export promotion (MEP) strategies applied in East Asian countries, though its results are quite different. (Eres [2005]).

To put it briefly, the year 1980 is very remarkable for Turkish economic system. Turkey moved away from import substitution industrialization (ISI) by leaning toward an export-oriented plan in the January 24 1980 Reform Package. Before, the domestic market was strictly protected with ISI strategies during the planning years. After 1980, through MEP strategies, manufacturing emerged as the primary exporting sector. All along, commodity trade liberalization and a managed floating exchange rate regime replaced a fixed rate regime, as part of the program implemented by a short-lived military regime that came to power in a right-wing coup following a period of economic crisis and social turmoil. Following a suppressive labor regime with the 1982 Constitution and 1983 Labor Code<sup>4</sup>, a very brief populist period followed, starting in 1989. With the period of rapid financial liberalization ended in a crisis in 1994. And in the years following the crisis, the distributional relations again turned against labor. The economy witnessed two more crises within seven years, in 1998 and 2001.

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<sup>3</sup> Some of the policies implemented are: the downsizing of State Economic Enterprises (SEEs), the promotion of exports by generous subsidies, real currency depreciation, and financial deregulation while at the same time 'reregulating' the labor market on the basis of new anti-labor legislation that was strongly backed by Bretton Woods Institutions (BWI).

<sup>4</sup> The Supreme Board of Arbitration was established by this code. The determination of the real wage started to be closely monitored and substantially repressed by continual state intervention (Eres [2005]).

There are studies on income distribution and profitability on Turkish manufacturing sector that provide insights about wage inequalities in this sector<sup>5</sup>. However, there are only a few studies discussing specifically wage differentials presumably due to data limitations. For example, Erdil [1993] analyzes inter-industry wage differentials in Turkish Manufacturing Industry over 1964 to 1989 and shows the persistency of inter-industry wage differentials in Turkish Manufacturing industry<sup>6</sup>. Bagdadioglu and Ercan [2001] provides results supporting this fact. Beyond that, this study estimates that wage inequality is higher in private than public sector. Ozmucur [1997] studies the differences in wages and labor productivity in manufacturing sub-sectors. Focusing on the role of ownership the study analyzes disparities between public and private sector wage structure in terms of the relations between wages and productivity. Similarly, Bayazitoğlu and Ercan [2001] states that ownership plays a significant role besides other factors such as firm size. Yet, there is still a need for an up-to date study, particularly on the patterns of inter-industry wage disparities.

The aim of this study is to present an empirical measurement of inter-industry wage differentials by using a clustering method, which is a new method only recently used in economics. The paper is organized as follows: Section 2 presents the empirical analysis explaining the data and clustering method. Section 3 reviews some policies and regulations in order to find possible explanations for the results. Lastly, section 4 summarizes the findings.

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<sup>5</sup> See Çağatay (1986), Ozmucur (1992, 1996), Metin-Özcan, et.al (2000), Onaran and Yentürk (2002)

<sup>6</sup> Among other factors, firm size, capital intensity, the share of administrative workers, the concentration ratio, the international competitiveness, and the unionization rate are found behind this wage pattern.

## 2. Empirical Analysis

### 2.1. Data

This study uses two different data sources; the Annual Manufacturing Industry Statistics<sup>7</sup> (AMIS) database and the OECD STAN dataset. The period of analysis covers the years 1980 to 2000 (the MEP and full-liberalization periods). AMIS, which is based on the international standard industrial classification of all economic activities revision number two (ISIC-Rev.2), is compiled from information collected from employers<sup>8</sup>. It includes all public and private establishments with more than ten employees. We used AMIS for the variables: wage payments, value-added and working hours. For trade indicators, the STAN dataset is used. The first estimates of exports and imports at current prices are derived from detailed information from OECD's International Trade in Commodities Statistics (ITCS) database. This dataset is based on ISIC-Rev.3. For consistency, a standard conversion from the ISIC-Rev.3 to ISIC Rev. 2 is used<sup>9</sup> via an industry equivalence table from STAN.

### 2.2. Clustering Method

Instead of taking the international standard classifications as given, this study makes use of a different industry clustering that is based upon the specific variable to be analyzed. The theoretical justification of such a method is the 'wage contours' approach suggested by Dunlop [1979]. He defined wage contours as congruities of wage-setting behavior which do not necessarily reflect a common process, location or product characteristics that may have given rise to those harmonized behaviors (Galbraith, J.K. and Calmon, D. P. [1996]: 433).

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<sup>7</sup> [http://www.die.gov.tr/konular/iy\\_sanayi.htm](http://www.die.gov.tr/konular/iy_sanayi.htm)

The wage cost is the gross wage payments done by the employer which includes all fringe benefits and overtime payments, income tax but excluding the social security payments and retirement benefits paid by the employer. Working hours and wage payments correspond to production workers only.

<sup>8</sup> The most reliable data resource on employment in Turkey is the household survey which has individual information and issued twice a year by State Statistical Institute. However, the absence of wage information in this survey leaves us with the second best choice.

<sup>9</sup> Please go to website for more details: <http://unstats.un.org/unsd/cr/registry/regcst.asp?CI=2>

Thus, common wage characteristics, he argues, are not only linked to the similarity of product markets but also linked to similar sources of the labor force or common labor market institutions (Dunlop [1979]). Many earlier studies either use more detailed levels of aggregation level in order not to lose information but nevertheless result in dividing what should be a homogeneous group and/or obtaining spurious results. Or they use a descriptive unit of analysis, such as sales as the basis for clustering, which fixes the reference point on the movements of a different variable. However, for the reasons given above, both are problematical (Galbraith, J.K. and Calmon, D. P. [1996]: 435).

For our purposes, first, we chose the best possible indicator for wage differentials, which is the deviation of hourly wage cost within each industry from the weighted average of whole manufacturing<sup>10</sup>. Then, using Ward's method, we applied the clustering procedure<sup>11</sup>. It is observed that, clustering effectively isolates low wage paying sub-industries from others, even though they might belong to same product group (See Table A1 in Appendix). For example, the manufacture of scientific and optical instruments (385) is assigned to the low wage cluster (cluster 2) which includes the machinery and equipment industry. It indicates that the scientific and optical instruments sector is a low wage industry, even though it uses a high level of technology. Similarly, the textiles and textile products sector and food, beverage and tobacco industries are segregated into two clusters as lowest wage and low

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<sup>10</sup> The percentage difference is used in order to convert the series into a unit free one. The average hourly wage is calculated by dividing the yearly total payments to workers by the total hours of working for the whole manufacturing industry. The data consists of 21 (from 1980 to 2000) annual measures of 29 three-digit ISIC sectors in manufacturing industry hourly wage percentage differences from the average hourly wage.

<sup>11</sup> Ward's method performs clustering by seeking at each step the minimum ratio within clusters to the total variance in whole differences set and existing cluster means. Ward's method is a hierarchical type of agglomerative nesting method. It follows iterative steps. At the first step it treats all industries as separate clusters. Then checking the dissimilarity among the industries according to an index formed based on their distance from the centroid of the cluster, either the latter is merged or not. This iterative step goes on until all the industries are members of clusters. In order to test whether Ward's clustering method gives appropriate results average linkage method is used as well. Since both methods give the same results it can be concluded results passed the assessments tests. For the details please see Galbraith, J.K. and Calmon, D. P. (1996) as well as Kaufman, L. and P.J. Rousseeuw (1990). (Detailed printed results can be provided via request)

wage groups (cluster 1 and 2). Other examples are separation of manufacturing of plastic products and manufacturing of fabricated metal products except machinery and optical goods, in the low tech-low wage cluster (cluster 2) from high and medium tech-high wage group (cluster 4). The manufacturing of non-metallic mineral products are separated into three clusters (manufacturing of glass and glass products are in high wage cluster (cluster 4), manufacturing of pottery and earthenware is low wage paying (cluster 2) whereas the other non-metallic mineral manufacturing is among the average wage paying industries (cluster 3). All these show evidence that within standard product type groups there are different wage patterns.

### **2.3. Wage Differentials across Clusters**

The wage differentials obtained as percentage differences of each cluster's weighted<sup>12</sup> average compared to the overall average can be seen in Figure 1. The figure shows time path of the differentials by clusters over the period. We observe two interesting facts here: first, the wage across clusters is hierarchical; and, second, it seems clear that wage patterns experienced substantial changes after the year 1988. Note particularly, the rising trend in the high wage cluster and the falling lowest and low wage clusters. From 1982 to 1988, all paths follow a comparatively a stable course. However, after 1988, they diverge drastically from the average (except cluster 3). The most extreme divergence is observed between the low average wage clusters (cluster 2 and 3) i.e. 40% points, which denotes 2000% rise in the degree of deviance from 1988 to 2000<sup>13</sup>.

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<sup>12</sup>For each cluster, a single weighted average hourly wage is calculated where the number of hours worked is used as weights

<sup>13</sup> The one between low wage (cluster 2) and high wage (cluster 4) clusters increased by 106%. The lowest wage (cluster 1) and low wage (cluster 2) clusters diverged from each other by 86% more. Lastly, the lowest change belongs to lowest wage (cluster 1) and high wage (cluster 4) clusters by 50%.

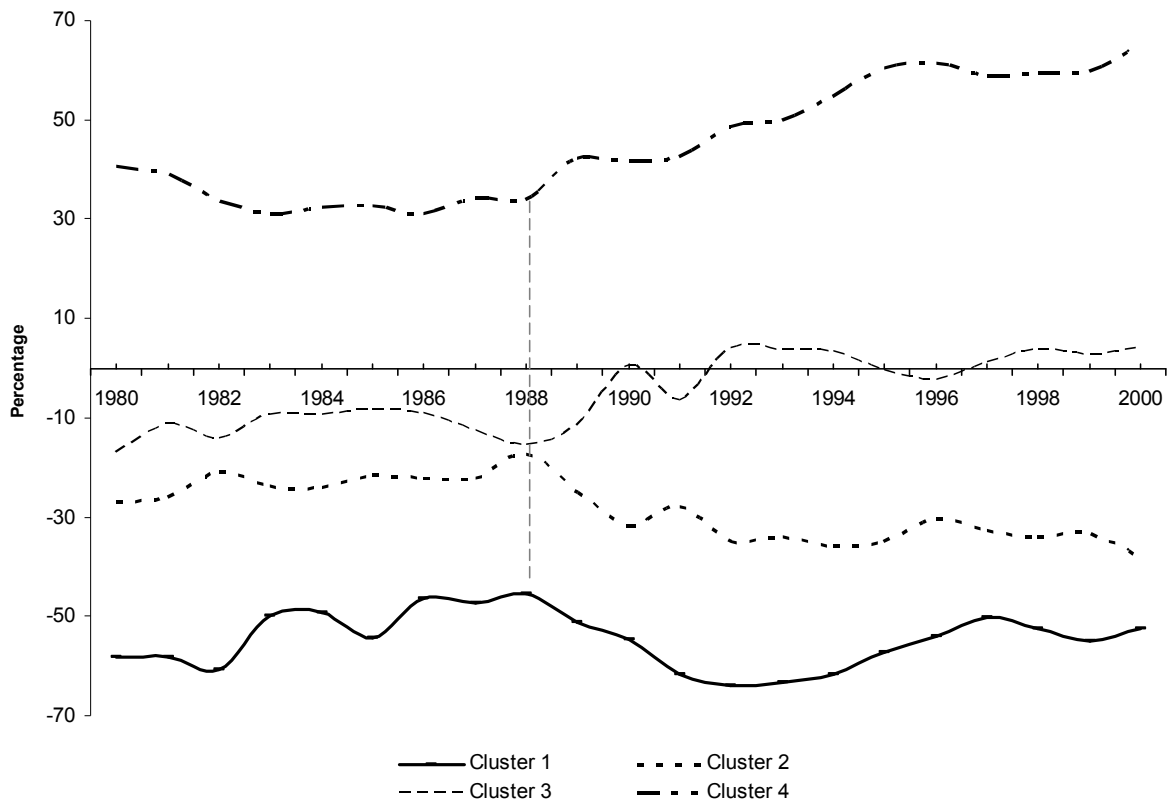


Figure 1. Percentage deviation of hourly wages from the average

#### 2.4. Labor Productivity Differentials

In the literature, productivity differentials are known to offer the source underneath wage differentials. Figure 2 shows the trend of labor productivity differentials<sup>14</sup> across clusters over the period. This figure somewhat confirms the literature; nonetheless, it is clear that productivity deviations are not as severe as wage deviations. (See also the evolution of labor productivity index across clusters in figure A3.1 in appendix) The disparity between low wage and average wage clusters (clusters 2 and 3) rises only by 30%<sup>15</sup> in 1990s compared to the 1980s. And this is the highest figure obtained among all. For instance, between the high

<sup>14</sup> Labor productivity is calculated as value added (deflated by GNP deflator 1980=100) per labor hour. Cluster deviance from the whole industry average labor productivity is calculated as taking the industry average as 100, productivity index for each cluster is calculated. Then the average is normalized at zero in order to reach percentage deviations.

<sup>15</sup> The figures correspond to geometric averages of annual differentials over the period mentioned.

wage (cluster 4) and the lowest wage (cluster 1) also with the low wage (cluster 2) cluster the degree of divergence degree 20% and 21% respectively in 1990s compared to the 1980s. The results suggest that though productivity differentials reflect on the wage structure in Turkish industry, they do not fully describe changes in its trend.

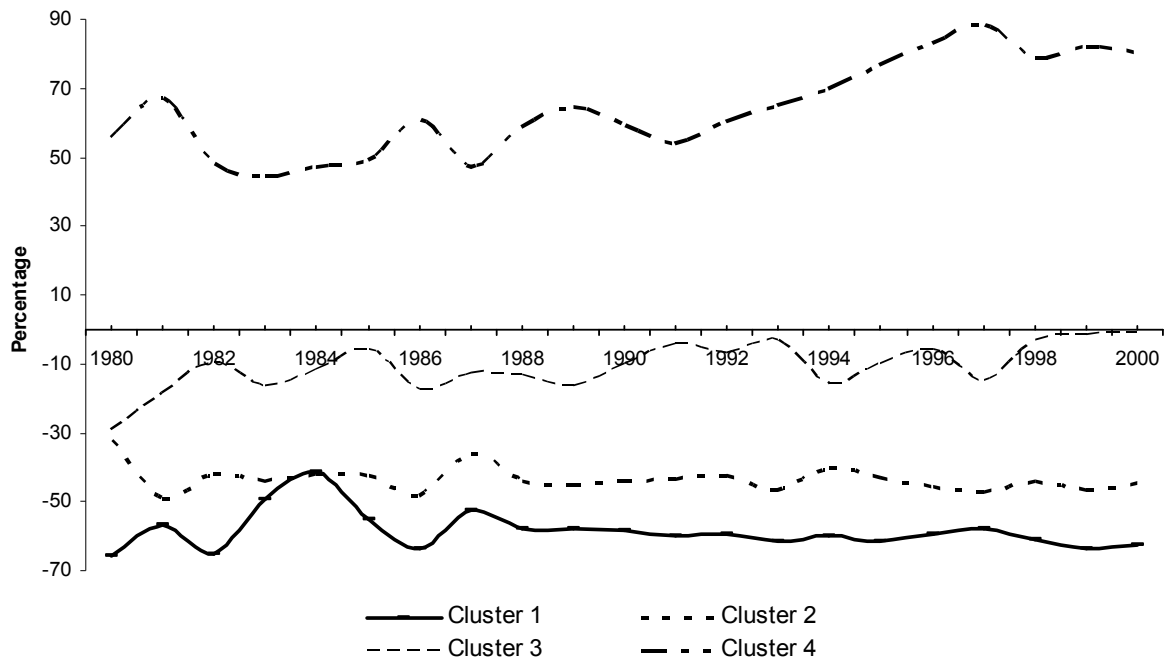


Figure 2. Labor productivity differentials

It is also possible to look at simple correlations between productivity and wage deviations to see how much the two trends reflect each other. The results show that correlations decline in 1990s compared to the 1980s in two clusters i.e. lowest wage and average wage clusters (clusters 1 and 3) (See tables in appendix A3.2). **This reflects the fact that the explanatory power of productivity variation declines in the 1990s.** One interesting result is that correlations are negative for cluster 2 and, even more interesting, that the figure doubles in 1990s compared to 1980s. As the productivity disparity falls, the wage disparity rises, which is counter to common expectations.

## 2.5. Does Liberalization Reduce Wage Disparity in Turkish Industry?

Turkey, as mentioned earlier in this paper, increased its openness by the enactment of stabilization program on January 24, 1980. This program through MEP policies induced a boom in exports. Later, in 1989, through the financial liberalization program, the process is ended with fully liberalized economic regime. Most of the gains in the manufacturing sector in the 1980s withered away by this new regime which was initiated due to fiscal pressures on one hand and on the other hand with pressures from Bretton Woods Institutions (BWI).

During the MEP period, regulations were such that manufacturing sector as a whole was supported not only by subsidies<sup>16</sup>, but also by many policies like reduced import tariffs, real currency depreciations and the suppression of real wages. Later, a series of trade regulations were pursued. Some of them are listed below:

- a) the alleviation of import restrictions in 1983<sup>17</sup>,
- b) reductions in import protection tariff<sup>18</sup> starting in 1992,
- c) General Agreement on Tariffs and Trade (GATT)-Uruguay Round Agreement is signed in 1993 after a seven year of continuing discussions<sup>19</sup>,
- d) enforcement of EU Customs Union agreement in 1996, which established zero duty rates and no quotas for non-agricultural items of EU and European Free Trade Association (EFTA) origin<sup>20</sup>,

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<sup>16</sup> The amount of export subsidies were huge enough that reached roughly 30% of the value of exports in the early 1980s (Taymaz (1999)).

<sup>17</sup> The positive import lists were changed to negative lists. The import lists were classified under three groups: the prohibited list (commodities that are not allowed to import), the approval list (commodities that require official permission to import) and the fund list (luxury goods that can be imported freely on condition of paying a levy). After 1983, the positive lists under these classifications changed to negative lists allowing all other goods free importation unless listed. This process involved almost all consumer goods imports; as such 60% of 1983 imports were liberalized

<sup>18</sup> Though tariff rates remained constant in the early 1980s, it first increased in late 1980s then declined after 1992.

<sup>19</sup> This agreement resulted in more liberalization for the developing world whereas on the other hand formed the basis for monopolizing for the advanced world via intellectual property rights.

- e) adaptation of EU's common external tariff (CCT) that resulted in lower duties for imports from many countries.

Through all these, Turkish economy has become a fully liberalized and an entirely open market economy installed over the period. The distributional impacts of this opening process have been discussed widely in the literature<sup>21</sup>. Here, the basic question for us is: given widening wage differentials across clusters within the liberalization period described above, what can we learn from cluster composition of exports over the period? In other words, are not these lower wage industries attached to trade, and if yes, does not liberalization reduce wage disparity?

For this, we checked the trend in manufacturing exports by clusters (See Figure 3). The shares of the lowest wage and low wage clusters (clusters 1 and 2) are combined together due to a matter of data in hand<sup>22</sup>. In line with the conventional trade theory, it is observed that commodities produced by using low technology are exported, in other words export goods are labor intensive ones from economies where labor is the abundant factor. The lowest and low wage clusters (clusters 1 and 2) shares sum up to more than half of the total manufacturing exports<sup>23</sup>. Note particularly, following the falling portion over 1980 to 1988, exports of these two clusters climb up almost to 60% by rising half of its 1988 figure. However, employees in these industries kept earning lower wages counter to standard expectations. During the whole period of openness, the MEP strategies did not change the fact that the majority of export goods are produced by low paying manufacturing industries.

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<sup>20</sup> An importer only needs a tax number not a license or document to import all i but restricted items.

<sup>21</sup> See Çağatay (1986), Metin-Özcan, et.al (2000), Onaran and Yentürk (2002)

<sup>22</sup> It is not possible to separate these clusters from each other with the data in hand due to difficulties in converting ISIC Rev.3 to ISIC Rev.2

<sup>23</sup> Except the four years from 1984 to 1988 the cluster's path lies above 50%. Moreover, not only within manufacturing but in total exports (in all industries) as well, the combined lowest and low wage clusters (clusters 1 and 2) has the highest share over the period. Their share lies above 40% in 1990s essentially after 1988 and reaches to 50% of total exports in 2000.

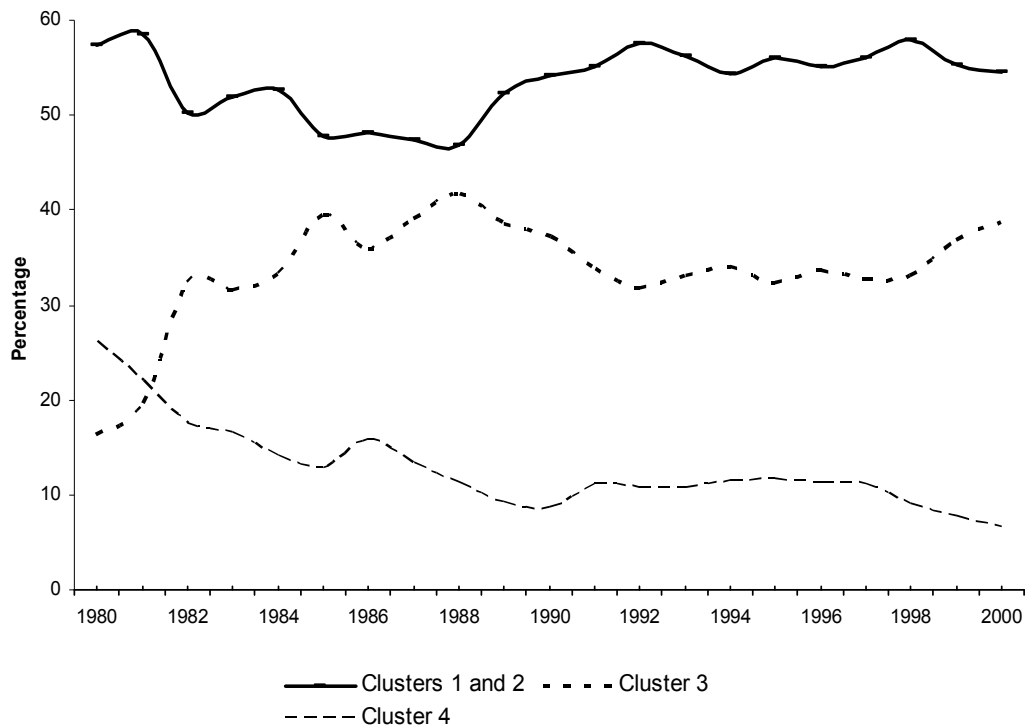


Figure 3. Cluster shares in manufacturing exports

Given the evidence above, in Turkish manufacturing industry, one can safely argue that Turkish experience builds a picture against traditional arguments, supporting critical views. The automatic mechanism in Heckscher-Ohlin theory cannot be confirmed in the Turkish case. Then, the challenge is to explain other possible sources of these persistent inter-industry wage differentials which are likely to be found as the outcomes of structural features inherent within the economic system or post-1980 policies and practices; or both<sup>24</sup>. The next section will briefly go over the post-1980 policies associated with their impacts on the wage structure and income distribution.

<sup>24</sup> Among other critical arguments, Botwinick (1993) provides an alternative theoretical framework arguing that the very existence of capitalist competition as an explanation for wage differentials. Developing further Marx's discussion of competition within and between industries, this study argues that it is the ongoing competition among capitals that sustain and transform the certain systematic patterns of inter- and intra industry wage differentials. Most of the persistent pattern of wage differentials, as mentioned, is the result of three main dynamics: the ongoing competition and technical change generating productivity and profitability differentials, the continuing generation of reserve army of unemployed and lastly the uneven efforts of organized workers to raise their wages within the strict limits defined by the first dynamic. Hence wage differentials within and between industries reflect these intertwined complex processes.

### **3. Do Post-1980 Liberalization Policies Tell More on Wage Disparities?**

Beyond the trade agreements and regulations referred briefly in Section 2.5, there are several other policies implemented along with the stabilization and structural adjustment programs after 1980.

#### **3.1. Labor Laws and Deregulation**

The 1980s started with the military regime and coupled with the 1982 Constitution that outlawed and protected worker rights as joining unions, rights to associate and bargain which are actually, fundamental human rights as recognized recently by ILO. These rights were given back partly in 1984 and partly in 1987. Nevertheless the general trend in falling real wages in the whole economy was not reversed until 1989. Ilkcaracan and Selim (2003) estimate that, controlling for other factors; the coverage of the working place under collective bargaining raises wages by 71%. Given the fact that collective bargaining is essentially setting wages in the public sector, the ownership distinction across clusters might be a significant factor on the pattern of wage differentials (See tables A4.1. and A4.2 for the public sector shares across clusters over time)

In order to see the possible impacts of these labor laws on laborer's bargaining power across clusters, we decomposed the average annual growth in real wages into average annual growth rate in wage share and the real value added per labor hour (See table 1). The figures verify differences across clusters. The lowest growth (3.9%) is obtained in the low wage cluster (cluster 2); with the highest stagnation in wage share (-2.4%). The growth of value added per labor is very close to the whole industry average over the period (6.3%), though. The highest growth (6.1%) belongs to high wage cluster (cluster 4) with the highest annual growth in value added per labor (8.2%).

**Table 1. Annual Growth of Real Wage, Wage Share and Value Added Per Hour (%)**

|                       | 1980-2000 |            |                      | 1980s     |            |                      | 1990s     |            |                      |
|-----------------------|-----------|------------|----------------------|-----------|------------|----------------------|-----------|------------|----------------------|
|                       | Real Wage | Wage Share | Value Added Per Hour | Real Wage | Wage Share | Value Added Per Hour | Real Wage | Wage Share | Value Added Per Hour |
| <b>Cluster 1</b>      | 4.8       | -1.3       | 6.1                  | 2.1       | -5.4       | 7.5                  | 3.4       | 1.6        | 1.9                  |
| <b>Cluster 2</b>      | 3.9       | -2.4       | 6.3                  | -0.2      | -5.9       | 5.7                  | 0.6       | -1.6       | 2.2                  |
| <b>Cluster 3</b>      | 6.0       | -1.4       | 7.5                  | 0.0       | -8.0       | 7.4                  | 1.6       | -1.5       | 3.1                  |
| <b>Cluster 4</b>      | 6.1       | -2.1       | 8.2                  | -0.9      | -8.2       | 7.3                  | 2.6       | -1.8       | 4.4                  |
| <b>All Industries</b> | 5.0       | -1.7       | 6.6                  | -0.8      | -7.1       | 6.3                  | 1.2       | -1.4       | 2.6                  |

Note: Calculations<sup>25</sup> are done by estimating the regression coefficients of equation 1 (See footnote below).

As it is clear in table 1, over the whole period, all of the clusters shows a negative annual average growth rate in wage share<sup>26</sup>. This offers evidence for a steady change in income distribution favoring profits vis-à-vis wages during the period. Note particularly the figures in 1980s, when none of the clusters show positive growth but instead present drastically large negative growth rates. Eres [2005] states that whole manufacturing industry profit rate shows explosive growth (546 per cent) from 1968 to 1988, for which the distributional arrangements played a significant role. After 1988, except for a four year recovery period, the profit rate growth started falling with a volatile trend that had further adverse effects on the wages.

<sup>25</sup> The compounded annual percentage growth rates: Equation 1:  $\ln(\text{variable})=a+bt$  where t states for time variable,  $b*100\%$  provides annual average growth rate in percentage. Decomposition of average real wages is performed by converting the following equation into growth rates equation.

Equation 2 :  $RW=(W/VA)*(RVA/L)$  where RW stands for hourly real wage, W, VA, RVA and L represent nominal value of wage payments, nominal value of value added, real value added and total number of hours worked respectively.  $RVA/L$  value added per labor hour which is used as a proxy for labor productivity. By equation 2, the growth rate of real wages on the left-hand side is equal to the sum of the growth rates of the terms on the right-hand side. Equation 3:  $grw = g(W/VA) + g(RVA/L)$

<sup>26</sup> Moreover, the following quote may offer an intuition on the direction of wage movements after the year 2000. In 2001, after 2001 financial crisis and the new minister of treasury Kemal Dervis, mentioned during his presentation in July 2003 as a part of the World Bank's Practitioners in Development Series that though it was very hard to do, he had to decrease the real wages by 20% since 2001. Dervis took office shortly after the collapse of the Turkish lira halved its value and sent overnight interest rates to more than 5,000 percent.

On the other hand, the domestic terms of trade between agriculture and manufacturing deteriorated against agriculture through state price regulations by keeping agricultural support prices lower than the inflation rate over the period. This deterioration shifted agricultural population to other sectors usually filling the low-paid, low technology industries and filling the places for unemployed in the reserve army of labor that definitely have both direct and contagion effects on the wage structure. Yeldan (2001) estimates the share of marginal and informal labor in total manufacturing industry employment as much as 41% in 1980. This number increases to 49% in 1994<sup>27</sup>. Hence marginalization phenomenon turned out to be a structural feature of the labor market over the period. The creation of free trade zones and export processing zones<sup>28</sup> also created an impetus for marginalization, which became the social basis of exporting industries<sup>29</sup>. With the enactment of Free Trade Zones

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<sup>27</sup> Besides, the acceleration of capital movements leading to volatility in the real sector, it inflicts bankruptcies particularly of small and medium sized establishments where majority of workers are informal, marginal and coming from vulnerable segments of the society. Even among the formal employment, particularly, women workers are in the majority working within small and medium sized establishments. Ozler (2000) shows evidence for increase in female share of employment in a plant when its exports to output ratio increases using Turkish manufacturing industry plant level data during 1983-1985. Such gender implications are not specific to Turkish experience of liberalization process. Cagatay, N., Elson, D. and Grown, C. (1995), provides a summary of studies assessing the gender impact of structural adjustment and macroeconomic stabilization policies throughout the developing world. These features of the exporting sectors are not unique to Turkey but in many other developing countries taking up such policies.

<sup>28</sup> There are many different types of export processing zones focusing mainly on textiles and garment, electronics and leather industry production. Investing countries are France, USA, Netherlands, Germany, Switzerland, UK, Italy and Japan. In Turkey there is the single industry zone, leather industry zone. In 2003, the export share of EPZs in total exports was 45%. (for EPZ resources see <http://www.ilo.org/public/english/dialogue/sector/themes/epz.htm>)

<sup>29</sup> Moreover, in 1986, a supplementary decree titled Foreign Capital Framework Decree was enacted widening the content of the Law Concerning the Encouragement of Foreign Capital issued in 1954. Some of the exemptions provided to foreign capital were as follows: 100% customs duties exemptions for all machinery and equipment required for investment, between 30% and 100% exemption on corporate tax paid for fixed capital investment, exemption of charges, taxes and duties on credits if 20% of the production is committed for exportation, and they would be rewarded by several premiums such as investment premiums or resource allocation support premium. As a result, though the figures are low compared to other developing countries, with these generous incentives, foreign direct investment (FDI) increased significantly. At the end of 1999, the share of manufacturing sector in total FDI was 46.1% and its share increased in the sectoral distribution of number of permissions allowed since 1997. (SPO, 8th five-year development plan-FDI Commission Report (2000)). The share of foreign firms in private sector of manufacturing industry increased from 1% in 1983 to 2% in 1999 and 3.5% in 2000. And the share of these firms in manufacturing employment increased gradually from 6% in 1983 particularly after the year 1988 to reaching 11% in 2000. (Taymaz and Lenger (2004)).

Law in 1985 all of the duties, taxes and charges are treated differently by legislation. Income and revenue generated in free trade zones are exempted from income or revenue taxes, along with several incentives. One other significant group of policies that induced informalization in the labor market was the policy on privatization.

### **3.2. Privatization**

Privatization policies such as the deregulation of price controls on commodities produced by state-owned enterprises (SOEs), imposing user charges for public goods and services<sup>30</sup>, contracting-out, selling shares of assets were implemented as a solution to budget deficits<sup>31</sup>. Several statutory monopolies such as Tea and Tobacco Monopoly, Electricity Power Monopoly were devastated with the same justification<sup>32</sup>. All these apparently had huge impacts not only on the wage structure but also on the employment structure of industries. Privatization led to significant employment losses and earnings losses in reemployments (Tansel [2001]). Comparing the pre- and post-dismissal jobs earnings of reemployed workers she concludes that they can only earn 33% of their SOE earnings<sup>33</sup>. The study also provides that the post-dismissal jobs were not only worse in terms of pecuniary earnings but worse in terms of quality i.e. lower labor standards, no premiums or fringe benefits.

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Taymaz and Lenger (2004) further state the fact that the full liberalization of financial system in 1989 provided an additional driving force for foreign investment.

<sup>30</sup> Besides other public goods such as tolls, fees in public hospitals or tuitions in higher education at public universities, in 1984, the law which allows for establishment of private schools was passed which are exempt from personal or corporate taxes.

<sup>31</sup> These policies were put forward as the action commitments, in order to achieve economic growth, in the 5th five year development plan (1985-1990) and the 6th five year development plan (1990-1994). In the former plan it is announced that public investment would focus on only on infrastructure. In the latter several policies are implemented for public enterprises.

<sup>32</sup> In 1986, the law concerning the denationalization of SOEs was passed, appointing the prime ministry as the agency to carry out the process. Privatization of SOEs, which was expected to be a solution for public budget deficits, became an arena for wild competition and corruption and led to employment losses on one hand and increases in imports of intermediate goods that were before provided by SOEs on the other. The efforts to raise private entrepreneurship ended up in some cases new burdens for the state hence for the people.

<sup>33</sup> This is supported by the ILO report 'Labour market policy for restructuring in Turkey: The need for more active policies'. Downloadable at [www.ilo.org/public/english/employment/strat/download/ep51.pdf](http://www.ilo.org/public/english/employment/strat/download/ep51.pdf).

In order to see the cluster differences in the context of public/private ownership, public sector shares in value added and employment were estimated (See tables A3.1 and A3.2 in appendix). It is observed that in the low wage (cluster 2) and lowest wage (cluster 1) cluster, public shares are negligible compared to higher wage clusters (clusters 3 and 4) essentially after 1995. Given the fact that public sector hourly wages are higher than in the private sector in all clusters (see table A2.3 in appendix) part of the wage differentials reflect the disparity between public and private sector wage trends.

#### **4. Results and Concluding Remarks**

The empirical measurement of hourly wage differentials within Turkish manufacturing industry indicates that wage differentials between industries during the export-led industrialization phase of Turkish economy exhibit a substantial change in manufacturing wage patterns in the late 1980s, which can be described as the period when the economy moved to full-liberalization period.

The results first demonstrate the importance of reclassifying industrial data based on the variable to be analysed. Evidence for widening wage differentials in Turkish manufacturing industry over the period 1980 to 2000 supports arguments against conventional theories. Furthermore, the study presents evidence against the arguments that wage structure is stable and neutral to policy changes.

## References:

- Akerlof, G.A. and J. Yellen (1986), *Efficiency Wage Models of the Labor Market*, Cambridge: Cambridge University Press.
- Akyuz, Y. (2005), "Trade, Growth and Industrialization: Issues, Experience and Policy Change", Turkish Economic Association Discussion Paper, 2005.
- Arbache, J.S., A., Dickerson and F., Green (2001) "Assessing the Stability of the Inter-industry Wage Structure in the Face of Radical Economic Reforms", *Studies in Economics from Department of Economics*, University of Kent
- Arıcanlı, T. and D. Rodrik, (ed.), *The Political Economy of Turkey: Debt, Adjustment and Sustainability*, June 1990, Palgrave, Macmillan.
- Bağdadıoğlu, E. and H. Ercan (2001) "Union-Nonunion Average Wage Series in Turkish Manufacturing." In T. Bulutay (Ed.), *Wages, Income and Wage Distributions*, pp.163-206. Ankara: State Institute of Statistics, Printing Division.
- Bayazıtöđlu, B. and H. Ercan (2001) "Turkish Manufacturing Wages: Inter-Industry Earnings Inequality." In T. Bulutay (Ed.), *Wages, Income and Wage Distributions*, pp.207-242. Ankara: State Institute of Statistics, Printing Division.
- Becker, G. (1964), *Human Capital*, New York: Columbia University Press
- Boratav, K. (1990), "Inter-Class and Intra-Class Relations of Distribution under SA: Turkey During the 1980s", in *The Political Economy of Turkey: Debt, Adjustment and Sustainability*, Arıcanlı, T. and D. Rodrik, (ed.), June 1990, Palgrave, Macmillan.
- Botwinick, H. (1993), *Persistent inequalities: Wage disparity under capitalist competition*, Princeton: Princeton University Press.
- Doeringer, P. B. and Piore, M. J. (1971) *Internal Labour Markets and Manpower Analysis*, Lexington: Heath.

- Dunlop, J.T. (1979), "Wage Contours" in M. J. Piore, (ed.), *Unemployment and Inflation: Institutional and Structuralist Views*, Armonk, ME Sharpe.
- Edwards, R. 1979. *Contested Terrain: The Transformation of the Workplace in the Twentieth Century*, New York: Basic Books
- Erdil, E., (1993), Inter-Industry Wage Differentials in Turkish Manufacturing Industry, 1964-1989, Unpublished M.S., Thesis, Department of Economics, Middle East Technical University.
- Eres, B. (2005), *The Profit Rate in the Turkish Economy: 1968-2000*, Unpublished PhD. Dissertation, Department of Economics, University of Utah.
- Freeman, R. (1995), "Are Your Wages Set in Beijing?" *Journal of Economic Perspectives* Summer, pp. 15-32.
- Galbraith, J.K. and Calmon, D. P. (1996), "Wage Change and trade performance in US manufacturing industries", *Cambridge Journal of Economics*, 20, p.433-450.
- Gordon, D., R. Edwards and M. Reich, (1982) *Segmented Work, Divided Workers: The Historical Transformation of Labor in the U.S*, New York: Cambridge University Press.
- Hicks, J. R. (1963), *The Theory of Wages*, 2nd Edition, St. Martin's Press, New York
- Ilkcaracan, I. and R. Selim (2003) "The Role of Unemployment in Wage Determination: Further Evidence on the Wage Curve from Turkey", *Applied Economics*, 35 (14), pp.1589-98
- Katz, L. and L., Summers (1989), "Industry Rents: Evidence and Implications," *BPEA Microeconomics Annual*, pp. 209-75.
- Kaufman, L. and P.J. Rousseeuw (1990), *Finding Groups in Data: An Introduction to Cluster Analysis*, Wiley, New York Chp.4

- Krueger, A. and L., Summers (1987), "Reflections on the Interindustry Wage Structure" in Lang, K. and J. Leonard eds. *Unemployment and the Structure of Labor Markets*, pp. 17-48.
- Ozler, S. (2000), "Export Orientation and Female Share of Employment: Evidence from Turkey", *World Development* 28 (7), pp. 1239-1248
- Özmucur, S. (1997) "Productivity and Profitability in the 500 Largest Firms of Turkey, 1980-1995" ERF Working Paper, No: 9713
- Rodrik, D. (1990), "Some Policy Dilemmas in Turkish Macroeconomic Management", in *The Political Economy of Turkey: Debt, Adjustment and Sustainability*, Arıcanlı, T. and D. Rodrik, (ed.), June 1990, Palgrave, Macmillan.
- Tansel, A. (2001), "Effects of Privatization on Labor in Turkey", Economic Research Center (ERC), Research Papers, 2001/03, Middle East Technical University.
- Wood, A., (1997), "Openness and Wage Inequality in Developing Countries: The Latin American Challenge to East Asian Conventional Wisdom," *World Bank Economic Review*, Oxford University Press, vol. 11(1), pages 33-57, January
- Wood, A., (1995), "How Trade Hurt Unskilled Workers," *Journal of Economic Perspectives*, American Economic Association, vol. 9(3), pages 57-80, Summer
- Yeldan, E., (2001), *Kuresellesme Surecinde Turkiye Ekonomisi: Bolusum, Birikim, Buyume,-* (Turkish Economy throughout the Globalization Process: Distribution, Accumulation, Growth), 2001, Istanbul, Iletisim Yay.

## Appendix

### A1. List of industries clustered

#### Cluster 1 Lowest wage

- 322 Manufacture of wearing apparel, except footwear
- 323 Manufacture of leather and products of leather, leather substitutes and fur, except footwear and wearing apparel
- 332 Manufacture of furniture and fixtures, except primarily of metal

#### Cluster 2 Low wage

- 321 Manufacture of textiles
- 324 Manufacture of footwear, except vulcanized or moulded rubber or plastic footwear
- 331 Manufacture of wood and wood and cork products, except furniture
- 356 Manufacture of plastic products not elsewhere classified
- 361 Manufacture of pottery, china and earthenware
- 381 Manufacture of fabricated metal products, except machinery and equipment
- 385 Manufacture of professional and scientific, and measuring and controlling goods equipment not elsewhere classified, and of photographic and optical
- 390 Other Manufacturing Industries

#### Cluster 3 Average wage

- 311 Food manufacturing
- 312 Food manufacturing (not elsewhere classified and prepared animal feeds)
- 314 Tobacco manufactures
- 369 Manufacture of other non-metallic mineral products

#### Cluster 4 High wage

- 313 Beverage industries
- 341 Manufacture of paper and paper products
- 342 Printing, publishing and allied industries
- 351 Manufacture of industrial chemicals
- 352 Manufacture of other chemical products
- 353 Petroleum refineries
- 354 Manufacture of miscellaneous products of petroleum and coal
- 355 Manufacture of rubber products
- 362 Manufacture of glass and glass products
- 371 Iron and steel basic industries
- 372 Non-ferrous metal basic industries
- 382 Manufacture of machinery except electrical
- 383 Manufacture of electrical machinery apparatus, appliances and supplies
- 384 Manufacture of transport equipment

### A2.1.1 Cluster Shares in Value Added in Total Manufacturing (%)

|           | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Cluster 1 | 0.9  | 1.4  | 1.4  | 2.1  | 2.5  | 2.6  | 2.1  | 3.3  | 3.6  | 3.9  | 3.9  | 3.9  | 4.5  | 4.5  | 4.9  | 5.2  | 5.8  | 4.9  | 4.4  | 4.1  | 4.2  |
| Cluster 2 | 21.5 | 18.0 | 18.3 | 19.0 | 19.9 | 19.2 | 17.1 | 21.0 | 18.4 | 17.8 | 18.7 | 17.9 | 18.6 | 17.8 | 19.9 | 19.6 | 19.7 | 20.8 | 22.1 | 20.8 | 22.0 |
| Cluster 3 | 20.3 | 20.9 | 23.5 | 20.2 | 21.3 | 21.9 | 18.5 | 18.9 | 18.3 | 18.1 | 17.8 | 19.7 | 18.9 | 18.9 | 16.9 | 17.3 | 17.4 | 14.9 | 16.8 | 18.3 | 17.7 |
| Cluster 4 | 57.3 | 59.7 | 56.7 | 38.7 | 42.0 | 56.3 | 62.3 | 56.8 | 59.7 | 60.2 | 59.6 | 58.6 | 58.0 | 58.8 | 58.2 | 57.9 | 57.2 | 59.3 | 56.7 | 56.7 | 56.1 |

### A2.1.2 Cluster Shares in Number of Hours Worked in Total Manufacturing (%)

|           | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Cluster 1 | 2.7  | 3.1  | 4.2  | 4.2  | 4.3  | 5.8  | 5.7  | 6.9  | 8.4  | 9.4  | 9.7  | 11.1 | 11.6 | 12.3 | 13.6 | 14.3 | 11.6 | 11.3 | 11.3 | 11.3 |
| Cluster 2 | 31.8 | 35.5 | 31.6 | 33.9 | 34.1 | 33.3 | 33.1 | 32.8 | 32.8 | 32.4 | 31.7 | 32.4 | 33.2 | 33.2 | 34.4 | 36.2 | 39.4 | 39.5 | 38.8 | 39.7 |
| Cluster 3 | 28.7 | 25.6 | 25.9 | 24.2 | 24.2 | 23.2 | 22.4 | 21.7 | 21.1 | 21.6 | 20.6 | 20.3 | 19.5 | 20.2 | 19.3 | 18.4 | 17.5 | 17.4 | 18.7 | 17.9 |
| Cluster 4 | 36.8 | 35.8 | 38.3 | 36.8 | 36.6 | 37.7 | 38.8 | 38.6 | 37.7 | 36.6 | 38.0 | 36.2 | 35.7 | 34.3 | 32.8 | 31.2 | 31.5 | 31.7 | 31.2 | 31.1 |

### A2.2 Manufacturing Share of Employment in Total Employment and Contribution of Manufacturing Sector to Gross National Product (%)

|   | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Whole Manufacturing Share in Total Employment | --   | --   | --   | --   | --   | --   | --   | --   | 14.4 | 14.5 | 14.2 | 14.1 | 15.1 | 14.6 | 15.1 | 14.9 | 15.5 | 16.5 | 16.2 | 15.8 | 17.3 |
| Whole Manufacturing Share in GNP              | 17.1 | 19.4 | 20   | 19.1 | 18.1 | 18.3 | 22.2 | 21.8 | 23   | 23.1 | 22   | 22.2 | 21.6 | 20.8 | 22.1 | 22.6 | 21.1 | 21.6 | 19.4 | 19.2 | 19.2 |

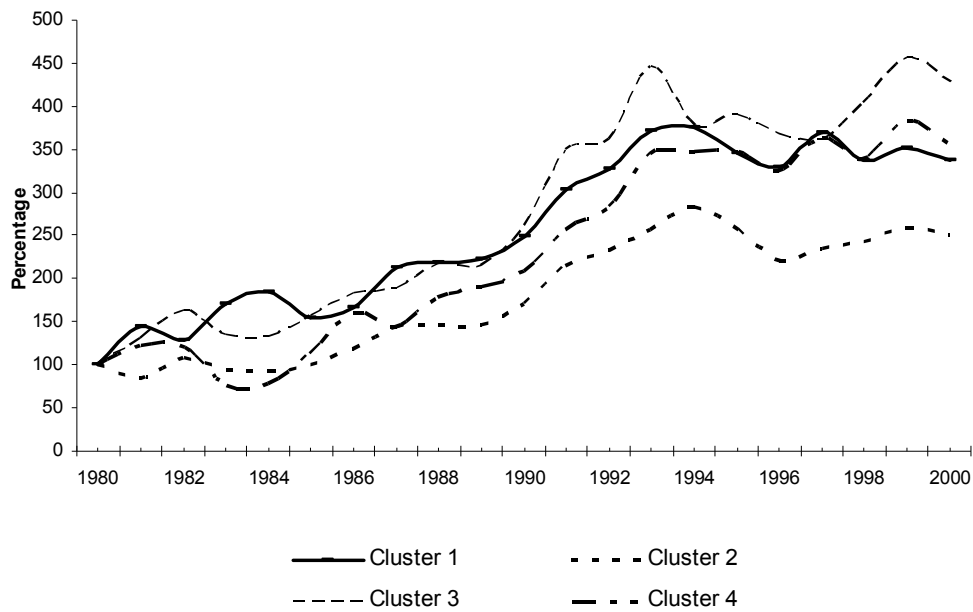
Source: State Planning Organization, Main Economic Indicators

### A2.3 The Ratio of Private Sector Wage to Public Sector Wage Payments (%)

|           | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Cluster 1 | 33.8 | 70.8 | 46.5 | 63.3 | 56.9 | 41.5 | 54.7 | 68.3 | 53.7 | 61.8 | 42.9 | 45.2 | 37.4 | 36.9 | 27.1 | 28.7 | 46.1 |
| Cluster 2 | 70.2 | 66.9 | 60.2 | 76.3 | 84.1 | 84.2 | 88.0 | 81.0 | 75.1 | 63.0 | 65.7 | 61.2 | 51.4 | 50.1 | 43.5 | 46.8 | 55.3 |
| Cluster 3 | 73.2 | 62.2 | 74.7 | 65.4 | 82.3 | 79.9 | 82.9 | 79.7 | 89.0 | 61.1 | 70.4 | 53.5 | 47.4 | 48.5 | 44.6 | 49.0 | 56.7 |
| Cluster 4 | 63.8 | 61.2 | 63.3 | 75.6 | 81.6 | 86.4 | 94.8 | 97.7 | 99.1 | 78.3 | 83.7 | 71.1 | 67.6 | 63.3 | 59.4 | 77.1 | 77.3 |

Note: Calculations are done by obtaining the percentage ratio of private sector hourly wages to public sector hourly wages for each cluster in each year.

### A3.1 Labor Productivity Index



### A3.2 Correlations between Wage and Productivity Deviance

#### Summary Table for 1980s

|                         |   | Wage Deviations |       |       |       | Productivity Deviation |       |       |      |
|-------------------------|---|-----------------|-------|-------|-------|------------------------|-------|-------|------|
|                         |   | Clusters        |       |       |       |                        |       |       |      |
|                         |   | 1               | 2     | 3     | 4     | 1                      | 2     | 3     | 4    |
| Wage Deviations         | 1 | 1.00            |       |       |       |                        |       |       |      |
|                         | 2 | 0.44            | 1.00  |       |       |                        |       |       |      |
|                         | 3 | 0.29            | -0.07 | 1.00  |       |                        |       |       |      |
|                         | 4 | -0.42           | -0.58 | -0.50 | 1.00  |                        |       |       |      |
| Productivity Deviations | 1 | 0.42            | -0.03 | 0.56  | -0.35 | 1.00                   |       |       |      |
|                         | 2 | -0.17           | -0.13 | -0.54 | 0.18  | -0.07                  | 1.00  |       |      |
|                         | 3 | 0.16            | 0.65  | 0.49  | -0.57 | 0.36                   | -0.28 | 1.00  |      |
|                         | 4 | -0.06           | -0.24 | -0.18 | 0.64  | -0.44                  | -0.50 | -0.40 | 1.00 |

#### Summary Table for 1990s

|                         |   | Wage Deviations |       |       |       | Productivity Deviation |       |       |      |
|-------------------------|---|-----------------|-------|-------|-------|------------------------|-------|-------|------|
|                         |   | Clusters        |       |       |       |                        |       |       |      |
|                         |   | 1               | 2     | 3     | 4     | 1                      | 2     | 3     | 4    |
| Wage Deviations         | 1 | 1.00            |       |       |       |                        |       |       |      |
|                         | 2 | -0.07           | 1.00  |       |       |                        |       |       |      |
|                         | 3 | 0.04            | -0.85 | 1.00  |       |                        |       |       |      |
|                         | 4 | 0.57            | -0.54 | 0.34  | 1.00  |                        |       |       |      |
| Productivity Deviations | 1 | 0.00            | 0.42  | -0.29 | -0.44 | 1.00                   |       |       |      |
|                         | 2 | -0.49           | -0.24 | 0.03  | -0.24 | 0.13                   | 1.00  |       |      |
|                         | 3 | 0.03            | 0.02  | 0.03  | 0.13  | -0.67                  | -0.42 | 1.00  |      |
|                         | 4 | 0.75            | -0.32 | 0.26  | 0.91  | -0.21                  | -0.46 | -0.03 | 1.00 |

#### A4.1 The Share of Public Sector in Total Industry by Clusters (%)

|      | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 |
|------|-----------|-----------|-----------|-----------|
| 1980 | 0.9       | 13.7      | 44.6      | 49.8      |
| 1981 | 6.8       | 12.6      | 50.5      | 55.4      |
| 1982 | 1.8       | 12.6      | 57.6      | 49.0      |
| 1983 | 1.9       | 12.6      | 51.2      | 62.5      |
| 1984 | 0.5       | 13.3      | 46.8      | 51.9      |
| 1985 | 12.2      | 10.7      | 50.7      | 43.6      |
| 1986 | 2.2       | 12.7      | 48.0      | 46.0      |
| 1987 | 2.3       | 10.4      | 42.5      | 37.0      |
| 1988 | 1.7       | 9.3       | 41.4      | 41.3      |
| 1989 | 1.6       | 9.0       | 37.7      | 44.2      |
| 1990 | 1.1       | 8.2       | 37.5      | 38.6      |
| 1991 | 1.7       | 7.3       | 39.8      | 37.9      |
| 1992 | 1.2       | 7.2       | 36.4      | 36.1      |
| 1993 | 2.7       | 6.9       | 29.3      | 31.9      |
| 1994 | 2.7       | 4.7       | 21.4      | 33.9      |
| 1995 | 2.4       | 3.6       | 17.8      | 35.4      |
| 1996 | 0.7       | 4.4       | 12.6      | 35.8      |
| 1997 | 0.6       | 3.3       | 9.5       | 34.8      |
| 1998 | 0.6       | 2.7       | 14.2      | 37.1      |
| 1999 | 0.1       | 2.7       | 18.3      | 31.8      |
| 2000 | 0.4       | 1.7       | 21.7      | 25.5      |

Note: Calculations are done by dividing the total public sector value added by the total value added produced for sub-industries within the clusters, for each year.

#### A4.2 Ratio of Private Sector to Public Sector in Annual Number of Hours Worked by Clusters (%)

|      | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 |
|------|-----------|-----------|-----------|-----------|
| 1980 | 1.2       | 16.9      | 55.1      | 39.2      |
| 1981 | 2.4       | 14.2      | 50.8      | 36.2      |
| 1982 | 1.1       | 14.6      | 50.6      | 33.5      |
| 1983 | 1.5       | 16.5      | 49.3      | 35.4      |
| 1984 | 0.6       | 16.4      | 48.8      | 34.7      |
| 1985 | 0.6       | 14.6      | 43.7      | 33.6      |
| 1986 | 1.7       | 16.3      | 41.7      | 33.7      |
| 1987 | 1.5       | 15.5      | 39.5      | 33.2      |
| 1988 | 2.9       | 14.5      | 38.2      | 31.8      |
| 1989 | 2.9       | 13.4      | 34.1      | 30.8      |
| 1990 | 2.7       | 13.0      | 35.0      | 30.5      |
| 1991 | 2.9       | 14.2      | 34.9      | 30.2      |
| 1992 | 2.1       | 12.0      | 33.3      | 28.4      |
| 1993 | 2.9       | 10.9      | 31.4      | 25.9      |
| 1994 | 4.9       | 9.8       | 30.8      | 27.2      |
| 1995 | 3.2       | 7.3       | 26.0      | 23.0      |
| 1996 | 1.7       | 6.3       | 22.5      | 20.4      |
| 1997 | 1.3       | 4.2       | 20.8      | 17.0      |
| 1998 | 1.2       | 3.2       | 20.5      | 16.1      |
| 1999 | 1.3       | 3.4       | 19.5      | 15.8      |
| 2000 | 1.5       | 2.5       | 18.7      | 14.2      |

Note: Total annual number of hours worked in private sector is divided by total number of hours worked in public sector in each cluster.