Structural Transformation and Labor Productivity in the Manufacturing Industry in Turkey: 1981-2000 Period

Abstract:

This study examines the effect of structural transformation on labor productivity growth in the manufacturing industry in Turkey for the period of 1981-2000. Structural transformation is defined as movement of the factor inputs of the sector from sectors which have relatively low productivity to the sectors which have relatively high labor productivity. The conventional shift-share analysis has been used in the purpose of showing the effect of structural transformation on rise of labor productivity of manufacturing sector. The empirical results do not support the structural bonus hypothesis. The empirical findings show that, structural transformation is not important in explaining rise of labor productivity for the period of 1981-2000. Moreover, the structural transformation seems to be burden rise of labor productivity rather than a bonus in during 1981-2000.

Keywords:

Economic Growth, Structural Transformation and Labor Productivity

Introduction

Structural transformation in Turkish economy is seen firstly at the beginning of the 1980s as a result of the first usage of liberalization applications. After 1980 in Turkey, Export-oriented industrialization and growth strategies created a certain growth performance. In this growth performance, shares of rise of labor productivity are extremely low (Kılıçaslan- Taymaz, 2006: 16-18). In other words, growth has taken place without developing increases in employment level. However, when development performance of countries are observed, we see that they are growing and developing mostly thanks to technological progress and accordingly with increasing in labor productivity. Therefore, the profile of sustainable growth is healthy and persistent only if it is based on labor productivity. Nevertheless, in the growth theory literature, structural transformation is just a redistribution of sources between key sectors (agriculture, industry and service) but with this definition rise of labor productivity is not exactly explained. Especially, in the key sectors which complete its development, structural transformation slows but rise of labor productivity continues. So, rise of labor productivity continues as a result of structural transformation in the sector in (itself) and between its sub-sectors. Thus, there is an increasing interest for the studies which is about that effects of redistribution of sources among sub-sectors of the manufacturing sector, which is defined as the structural transformation on labor productivity and growth.

The purpose of this study is to analyze the role and contribution of the structural transformation on explaining the rise of labor productivity in the sub-sectors of the manufacturing sector, which contributes to growth of Turkish economy in the period of 1981-2000. Following this frame, in the first part, I will explain the importance of rise of labor productivity which is the source of sustainable growth and also show the role of structural transformation which is the

redistribution of sources on explaining the rise of labor productivity. The study assumes the structural transformation as glides which are shown up in the factor shares between sub-sectors of the manufacturing sector in the perspective of growth literature. In this sense, structural transformation is defined as a heading sources from sub-sectors which are low labor productivity to the sub-sectors which are relatively high labor productivity. In the second part, structural transformation is analyzed through the method which shows the static and dynamic glide between sub-sectors of manufacturing sector itself and effects of inner sectors.

The method is that Conventional –Shift-Share Analysis. With this method, the question that how much rise of labor productivity is resulted from structural transformation in Turkish manufacturing sector for period of 1981-2000 is examined for the sustainable growth. Periods are examined and analyzed under two sub-periods. The first period is that period of 1981-1990 which in accelerating industrialization according to export-oriented strategies. Also, partial liberalization comes true. The second period is that period of 1991-2000 which in liberalization movements come true fully. In the following part of the study, empirical evidences about manufacturing sector and its sub-sectors are evaluated and compared to other similar studies.

Literature Review

We can talk about three basic elements of economic development. The first one is that quantity of used factors is growing by increment (increase in workforce or working hours and increase in quantity of input). The second one is that productivity of factors is growing by increment (good equipment, new technical infrastructure and organization forms). The last one is that using same amount input creating more value-added. This value-added surplus is possible when using factors more productive in the same production activity or directing sources to the sectors which have high labor productivity. Then, in the production process, increase in output is depended on realization of economic growth and increasing of capital accumulation, quality and decisiveness of sources of growth (Uygur, 1999:171). Thus, we can say that basic determinants of growth are capital accumulation, technological progress, employment increase and using factors more effectively between sectors and in the inner sector.

Accumulation of factor (increase in capitalization and increase in workforce) can be one of the most basic elements for economic growth but if there are no technical progress or tools which provide to get more output in the existing input level, there will be long-run growth which is non-permanent. When we analyze the development performance of countries, we find that this development performance is originated from mostly technological progress and correspondingly increase in labor productivity. So, a long term sustainable growth can come true thanks to increase in labor productivity in the production process. The most important factor which affects labor productivity is technology. Therefore, rise of labor productivity is provided in the light of technological progress. Accumulation of capital with technological progress and their relation in which they feed each other mutually and they speed up economic growth. Without technological

progress, capital accumulation is faced with decreasing saving returns. Thus, we can say that technological annihilates decreasing saving return of capital accumulation. So, labor productivity increases as a result of direct effects of advances in technology and also additional capital accumulation which is made possible thanks to technological progress. Also, technological progress increases total factor productivity which leads to make real economic growth and widener effect on capital accumulation. Consequently, sustainable growth is encouraged with rise in factor supply, advances in technology and increase in demand (Propenko, 2001:7).

Sources of economic growth show a change in time. Increase in labor productivity does not always have to originate from increase in capital stock. Sometimes, it is originated from using available resources more efficient or structural transformation. Without changing level of capital stock, moderation in labor productivity comes from slowdown in increasing rate of total factor productivity. There is a point which needs to be stated, growth performance of economies is not a sustainable phenomenon in every period. Thus, countries are faced with growth performance which is accelerating when they pass structural transformation in the first phases of progress but later it is steady growth performance.

Studies about moderation of growth rate assert different explanations. For instance, overshooting of prices of energy and petroleum in 1973 and 1979 is one of the factors which leads to moderation of growth rate. The other possible reason is that change in compound of workforce or economies glide from the manufacturing sector production which has high labor productivity circumstances to the service sector which has low labor productivity circumstances (Jones, 2001:44). Also, as a result of acceleration of globalization, convergence of technologies of countries, decreasing profit of real capital and divergence of financial capital from real capital are

the factors which lead to decrease in rise of labor productivity and create stabilizer effect on growth.

When we evaluate countries which show rapid growth in the last 20-30 years, we observe that their per capita income production is converged each other. In the Far East Asian countries which are consist of South Korea, Hong Kong, Singapore and Taiwan, we can see that growth rate in their GDP which is above %6. Committed studies show that this important part of "growth miracle" originated from cumulative increase in production inputs, expanding in physical and human capital in a large extent with investments in education, increasing in financial saving level, increasing in participation level of women in the workforce in a large extent and actual input unit as a result of gliding from agriculture to manufacturing sector. Although rise of total factor productivity (measure of output per input) is positive in Hong Kong, South Korea and Taiwan, it is not extraordinary. Also, it is smaller for Singapore (Kim and Lau, 1994; Young, 1995). So, growth of these countries which live miracle is contributed from rise of volumetric of inputs not from rise of total factor productivity (Sonobe and Otsuka, 2001). After all, Krugman (1994) exhibit that growth rate of these countries do not feed from increase in labor productivity. Alternatively, growth of these countries is originated from rapid increase in inputs. A growth which relies on accumulation of inputs instead of increase in productivity will eventually face with diminishing returns. In other words, Krugman (1994) stated that when rate of return of capital decreases, momentum of growth of this area get lost slowly (Krugman, 1994: 64-69). On the other hand, these countries succeed to grow quite long time without feeding from increasing in labor productivity. Then; we need to ask questions like that how these economies sustain to success in rapid growth quite long time although they are not based on accumulation of factor? Is the structural transformation source of this success of growth? Committed studies point out that structural

transformation plays an important role as far as rise of labor productivity for sectors and it is the basic operating plunger power for economic growth (Fagerberg, 1994; Fagerberg, 2000).

The Method

Topic of interaction of long term economic growth and structural transformation dynamics in an economy has an important position in the economic literature and roots of this topic go back to the classical economists. In traditional thinking, structural transformation is a gliding of shares of total production and employment levels between key sectors like agriculture, industry and service in time. However, in the most of the developed and industrialized countries, changes in manufacturing sector have become important because of shares of agriculture are so little to increase labor productivity. Hence, in this study, structural transformation is defined as a factor glide is shown up among sub-sectors of manufacturing sector. So, Conventional Shift-Share Analysis decomposing method is used to show the effects of structural transformation on labor productivity of the overall manufacturing sector. Thanks to this method, observing the effects of structural transformation within a sector or between sectors and dynamics of the firms (joining of new firms into the market, growing of firms and exiting of firms from market) on labor productivity is possible. Therefore, the method allows us to allocate rise of labor productivity and growth into resources. In general definition, "Productivity" is the ratio of the output index to used input index. However, in specific definition, labor productivity is the ratio of the produced output to hours worked or the number of employees. In this study, for the manufacturing sector, labor productivity is the ratio of the real production value to the number of employees. Shortly,

$$LP^{t} = (PV^{t} / L^{t}) \qquad (1)$$

LP shows that labor productivity of manufacturing sector and PV shows that real production value and L shows that number of employees. The superscript t shows selected time periods. After labor productivity of manufacturing sector is defined in this form, when connection

is shown up between labor productivity of total sector and labor productivity of each sub-sectors, Conventional Shift-Share Analysis equation can be reached. In the manufacturing sector, S_i shows the share of the each sub-sector in the total employment of the manufacturing sector. Subscript i shows each sub-sector. When we arrange the equation (1) as follows, it will allow us to see the connection between labor productivity of sub-sectors of manufacturing sector.

$$LP^t = (PV^t / L^t) = \sum_{i=1}^{n} (PV^t_i \, L^t_i / L^t_i \, L^t) = \sum_{i=1}^{n} PV^t_i \, S^t_i \qquad (2)$$

Equation (2) says that when labor productivity of each sub-sector (PV_i^t) and share of this sector in total employment level (S_i^t) is added together with their weight, total labor productivity of manufacturing sector can be reached. If we want to see structural transformation in specific time period, we have to select beginning year (by) and final year (fy). For this, we can take the difference of equation (2) in terms of beginning and final years and divide that difference into total labor productivity of manufacturing sector in the beginning year. Thus, we can get the Conventional Shift-Share equation:

$$(LP^{fy} - LP^{by}) / LP^{by} =$$

$$\sum_{i=1}^{n} \frac{\left(S_i^{fy} - S_i^{by}\right) LP_i^{by}}{LP^{by}} + \sum_{i=1}^{n} \frac{\left(S_i^{fy} - S_i^{by}\right)\left(LP_i^{fy} - LP_i^{by}\right)}{LP^{by}} + \sum_{i=1}^{n} \frac{(LP_i^{fy} - LP_i^{by}) S_i^{by}}{LP^{by}}$$

(Static Glide Effect) (Dynamic Glide Effect) (Effect of Inner Sector)

The first and second terms on the right side of the equality show total effect of structural transformation. When the first term shows the effect of static glide, the second term shows the effect of dynamic glide. The third term, on the other hand, shows that the effect inside each sector which states rise of labor productivity which is originated from within sector. When the effect of

inner sector is obtained, the employment level of that sector is kept constant and we look at how much rise of labor productivity is originated from the rise of labor productivity of that sector in itself. In structural transformation, differentiating the static glide and dynamic glide is important to see not only the effect of gliding of workforce to the sectors which have high labor productivity but also the effect of gliding to the sectors which have rapid growth performance.

Static glide shows that how much rise of labor productivity is originated from glide of workforce between sub-sectors. If this glide is going from sectors which have low labor productivity to sectors which have high labor productivity, this static glide term will be positive, in the opposite situation the term will be negative. Thus, this term shows the ability of the country to trigger the resources of that country from low labor productivity to high labor productivity. Dynamic glide term, on the other hand, tells us that gliding to the more dynamic sub-sectors like sectors which have higher rate of rise of labor productivity. This term will be positive if the sector which has the higher rate of rise of labor productivity, will increase its share in the total employment level. Thus, Dynamic glide term shows the ability of country to trigger its resources to the sectors which have higher rate of rise of labor productivity.

Decomposition of the rise of labor productivity in Turkish manufacturing sector

Turkish manufacturing sector production value, number of employees' data and indices are used in applying Conventional Shift-Share Analysis method and findings are represented of this study in Table 1, Table 2, Table 3 and Table 4. In the tables, first column shows that selected period and second column shows that growth of labor productivity in selected sectors. Other columns are follows in order: Static Glide Effect, Dynamic Glide Effect and Effect of Inner Sector and Total Effect.

Table-1	Rate of rise of labor productivity	Static Glide Effect	Dynamic Glide Effect	Effect of Inner Sector	Total Effect
1981-2000	6.68%	-0.14	-1.41	8.24	6.68
%		-2.10	-21.20	123.30	100

According to Table 1, labor productivity is grown by about 6.68% for Turkish manufacturing sector in the period of 1981-2000. Thanks to Conventional Shift-Share method, when we look at its sources, we can see that static glide effect which is caused by structural transformation is about -2.10%. Total effect of structural transformation which is total of static glide and dynamic glide is that -23.3%. On the other hand, Rise of labor productivity in inner sectors show that biggest contribution to total rise of labor productivity. So, Effect of inner sector is 123.30%.

Table 2-Low technology	Rate of rise of labor productivity	Static Glide Effect	Dynamic Glide Effect	Effect of Inner Sector	Total Effect
1981-2000	2.74%	-0.002	-0.16	2.64	2.47
%		-0.08	-6.68	106.76	100

In the second table which shows the rate of rise of labor productivity in low technology sectors and it is 2.74% in the period of 1981-2000. Static glide effect which is caused by structural transformation is that -0.08% and dynamic glide effect is -6.68%.So total effect of structural transformation in low technological sectors is that -6.76. On the other hand, effect of rise of labor productivity in inner sectors is that 106.76%. Thus, we can say that biggest contribution to the total rise of labor productivity comes from rise of labor productivity in inner sectors which is the effect of inner sector.

Table 3 - Medium technology	Rate of rise of labor productivity	Static Glide Effect	Dynamic Glide Effect	Effect of Inner Sector	Total Effect
1981-2000	3.71%	-0.05	-0.32	4.09	3.71
%		-1.38	-8.85	110.24	100

In the third table which shows the rate of rise of labor productivity in medium-tech sectors in the period of 1981-2000 and its rate is 3.71%. Static glide effect for rise of labor productivity in medium sectors is that -1.38% and dynamic glide effect is -8.85%. So, total effect of structural

transformation in medium sectors is that 10.23%. On the other hand, effect of the rise of labor productivity in inner sectors is that 110.24%. Thus, again in this table, biggest contribution to the rise of labor productivity in medium sectors comes from the rise of labor productivity in inner sectors which is effect of inner sectors.

Table 4-High Technology	Rate of rise of labor productivity	Static Glide Effect	Dynamic Glide Effect	Effect of Inner Sector	Total Effect
1981-2000	0.48%	0.01	0.15	0.31	0.48
%		2.64	33.06	64.30	100

In the fourth table, rate of rise of labor productivity is 0.48% in high technology sectors in the period of 1981-2000. Static glide effect is 2.64% and dynamic glide effect is 33.06. So, we can say that unlike other technological sectors, in high technological sectors total effect of structural transformation is positive and it is 35.7% but again the biggest contribution to the rise of labor productivity in high technological sectors comes from the rise of labor productivity in inner sectors which is effect of inner sectors and it is 64.30%. Thus, we can say that according to analysis and tables, contribution of structural transformation is weak on the rise of labor productivity in the period of 1981-2000. Hence, most of the growth of labor productivity of Turkish manufacturing sector is originated from the rise of labor productivity which is created by conditions of sector itself.

At this place, in the period of 1981-2000, we observe that shares of employment level of sub-sectors which have higher labor productivity than average are decreased. This situation is happened mostly in the labor intensive manufacturing sectors which have comparative advantages.

In conclusion, structural transformation for Turkish manufacturing sector decreased rise of labor productivity by 23.3% in the period of 1981-2000. Shortly, in the period of 1981-2000, rise of labor productivity is continued by increase in labor productivity of inner sector rather than extra gain which is created by structural transformation. There are several practices to show the negative effect of structural transformation on rise of labor productivity of manufacturing sector. For instance, Investment as a result of export-led growth strategy and its effect on free foreign trade policy and accordingly slip of production to the sectors which have high international competitiveness in short time but have low labor productivity source and more labor intensive. Also, efforts of decreasing the role of government on the economy is another negative effect of structural transformation on rise of labor productivity of manufacturing sector. All in all, according to committed analysis, we observe that effect of structural transformation among the sectors is quite limited on increase in labor productivity in the period of 1981-2000.

My findings about contributions of structural transformation on increase in labor productivity show harmony and consistency with other studies regarding this issue. For instance, Fagerberg (2000), in his study which includes Turkish manufacturing sector and 39 countries, he decomposed increase in labor productivity for manufacturing sector thanks to conventional shift share model and calculated that static glide effect (I) is -2%, dynamic glide effect (II) is -12.8% and effect of inner sector is 114.3% for Turkish manufacturing sector (Fagerberg, 2000: 402-403). Timmer and Szirmai (2000) show that in their decomposition study for The Far East Asian countries such as India, Indonesia, South Korea and Taiwan in the period of 1973-1993, contribution of structural transformation for these countries is so small that it can be negligible (Timmer and Szirmai, 2000: 376-378). Also, Suiçmez and Taymaz (2005), they show that by using Salter curves, contribution of structural transformation to increase in labor productivity in Turkish

manufacturing sector is negative for all period of 1982-2000 with taking 1982 as a base year. In other words, in all years after 1982, when compared to 1982, level of productivity is decreased as a result of increasing shares of employment level of sectors which have low labor productivity. In the period of 1982-1986, negative effect of structural transformation reached (minus) 18% by increasing constantly (Taymaz and Suiçmez, 2005: 34). Filiztekin (2005) reaches same conclusion in his study about decomposition of increase in labor productivity of private industry sector, he found that increase in labor productivity of inner sector is (positive) 6.9% and increase in labor productivity among sectors is negative (Filiztekin, 2005: 96-98; Altuğ- Filiztekin, 2006). Likewise, Kılıçaslan and Taymaz (2006) show that in their calculation of increase in labor productivity in manufacturing sector and its sources in the period of 1965-1999 for several countries and they find that structural transformation contribute nearly anything for increase in labor productivity. In other words, increase in labor productivity of manufacturing sector is originated from mostly increase in labor productivity of inner sector but only Malta, Jordan, Indonesian, Ireland, Iran and Singapore have positive contribution of structural transformation on increase in labor productivity in the period. More importantly, in the develop countries like USA, England, Japan, Canada and France, it is found that effect of structural transformation is ineffective to increase in labor productivity. For Turkish case, they found that increase in labor productivity is 3.4% in the period of 1965-1999 for manufacturing sector, 12% of this increasing comes from structural transformation and it is observed that this positive contribution takes place before 1980. After 1980, the opposite situation occurred and effect of structural transformation becomes negative (Kılıçaslan- Taymaz, 2006: 16-18).

Finally, Taymaz, Voyvoda and Yılmaz (2008) in their study, they show that in spite of experienced significant transformations in the economy, sectoral distribution of value-added of

Turkish manufacturing sector stays constant, in other words, there is no huge structural transformation in the manufacturing sector in the period of 1983-1999. They found that contribution of structural transformation to increase in labor productivity is high for the period 1983-19988 but it is low for the period of 1988-1993. After 1993, there is no contribution of structural transformation. Effect of structural transformation is observed in the sectors which is labor, resource and scale intensive. (Respectively 8%, 7% and 12%). Structural transformation plays an important role just in the resource intensive sectors and contributes increase in labor productivity throughout manufacturing sector by 14%. After 1993 period, for the first time, structural transformation gains importance in the specialized sectors (contribution rate: 7%) (Taymaz, Voyvoda and Yılmaz, 2008:78).

After all, taking structural transformation as a redistribution of labor factor among the sub-sectors may not be enough. Thus, besides the labor factor, capital factor needs to be considered simultaneously for structural transformation and then decomposition of effect of structural transformation on total factor productivity (TFP) will be more meaningful. Thus, we can look this considerations in the future studies.

Conclusion

The study shows that structural transformation is not successful to guide labor source from the sectors which have relatively low labor productivity to the sectors which have high labor productivity in Turkish manufacturing sector for the period of 1981-2000. Hence, in the context of crisis-stability-artificial and crisis- speculative growth process which are determinant of Turkish economy, there is quite low contribution of structural transformation to increase in labor productivity which is negligible in the all period of 1981-2000. It is worrisome that there is no contribution of structural transformation to increase in labor productivity when there are quite important changes in economic policies in the all period. Increase in labor productivity is approximately 6.78% per year and it can be resulted from applied encouragement programs, lowering real wages and extremely valuable exchange rate regime and their effect on increase in the entry of cheaper imports and stability and structural adjustment policies in the country-wide from 1980s. Also, it is exhibited that performed structural transformation as a result of applied stability and structural adjustment policies does not yield any extra (bonus) for increase in labor productivity of Turkish manufacturing sector in the period of 1981-2000. However, it seems that it brings structural burden rather than structural bonus for labor productivity of manufacturing sector. Shortly, structural transformation seems distant to explain the redistribution of labor factor among the sub-sectors (glide effect) and increase in labor productivity of total manufacturing sector. Total increase in labor productivity is originated from increase in labor productivity of inner sector for all sub-sectors of manufacturing sector that is to say accumulation of capital. Thus, if increase in labor productivity which leads to capital accumulation is wanted to sustain economic growth, investments need to be used in the purpose of creating structural transformation which is enactor of static and dynamic effects.

The reason of increase in labor productivity is not originated from structural transformation is that deferment of investments which provide to let the usage of new technology and using cheap workforce rather than skilled workforce. In this respect, at first glance worth-stressing issue is that using advanced technologies which provide to increase in labor productivity and then it can creates increase in production in manufacturing sector.

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