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Import Substitution, Productivity and Competitiveness: Evidence from Turkish and Korean Manufacturing Industry

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ABSTRACT

This paper examines the relation between import substitution, labour productivity and industrial competitiveness. The data used in the analysis are obtained from UNIDO Industrial Demand Supply Balance (2013) and UNIDO Industrial Statistics (2013) databases and cover the period of 1981-2001. Our results show that Turkish economy has really left import substitution after 1980. However, we found significant share of import substitution in total production in professional and scientific equipment, transportation equipment, electrical machinery, miscellaneous petroleum products, industrial chemicals industries and petroleum refineries in Korea especially in the 1990s. Our findings based on unbalanced dynamic panel data estimations showed that import substitution did not enhance labour productivity in manufacturing industry of both Korea and Turkey. However, we found that import substitution affects industrial competitiveness positively in both Korea and Turkey. Finally, we found in this study that while Korean manufacturing industry competitiveness is closely associated with labour productivity, competitiveness of Turkish manufacturing industry depends on the factors such as exchange rates, wage differentials rather than labour productivity.

Keywords: Productivity, Competitiveness, Import Substitution, Manufacturing, Turkey, Korea.

JEL Codes: L60, O12, O25.

İthal İkamesi, Üretkenlik ve Rekabet Edebilirlik: Türkiye ve Kore İmalat Sanayiinden Kanıtlar

ÖZ

Bu makale ithal ikamesi, emek verimliliği ve endüstriyel rekabet edebilirlik arasındaki ilişkileri incelemektedir. Analizlerde, 1981-2001 dönemlerini kapsayan UNIDO Industrial Demand Supply Balance (2013) ve UNIDO Industrial Statistics (2013) verileri kullanılmıştır. Bulgularımız, 1980 sonrası Türkiye imalat sanayiinde ithal ikamesinin gerçekten terkedildiğini göstermektedir. Fakat Kore'de, özellikle 1990'lı yıllarda profesyonel ve bilimsel ekipmanlar, ulaşım araçları, elektrikli makinalar, endüstriyel kimyasallar, petrol rafinerileri ve petrol ürünleri endüstrilerinde ithal ikamesinin önemli bir paya sahip olduğu bulunmuştur. Dengesiz dinamik panel data tahminlerine dayanan bulgularımız, ithal ikamesinin hem Kore hem de Türkiye imalat sanayilerinde emek verimliliğine önemli bir katkısının olmadığını göstermektedir. Fakat, hem Kore'de hem de Türkiye'de ithal ikamesinin endüstriyel rekabet edebilirliği olumlu olarak etkilediği ortaya çıkmıştır. Son olarak, bu çalışmada Kore imalat sanayii rekabet edebilirliğinin verimlilikle yakından ilişkili olduğu, fakat Türkiye imalat sanayiinin rekabet edebilirliğinin emek verimliliğinden ziyade döviz kurları, ücret farklılıkları gibi faktörlere bağlı olduğu bulunmuştur.

Anahtar Kelimeler: Üretkenlik, Rekabet Edebilirlik, İthal İkamesi, İmalat Sanayii, Türkiye, Kore.

JEL Kodları: L60, O12, O25.

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1. INTRODUCTION

In spite of the fact that the import substitution is not a new strategy and was widely used after WWII especially in developing countries including Turkey and South Korea (henceforth Korea), industrial productivity and competitiveness are still quite important topics in both developed and developing economies. This study, therefore, focuses on the relation between import substitution, labour productivity and industrial competitiveness. More specifically this paper tests if import substitution enhances both labour productivity and competitiveness in South Korean (henceforth Korean) and Turkish manufacturing industries.

The reason for choosing Korea and Turkey for a comparative analysis is that although Korea[1] and Turkey[2] accepted to be similar economies at the beginning of the second half of 20th century, Korea is shown as a successful example of industrialisation and growth while Turkey is not.

The data used in the analysis are obtained from UNIDO Industrial Demand Supply Balance (UNIDO-IDSB) (2013) and UNIDO Industrial Statistics (UNIDO-IS) (2013) databases and cover the period of 1981-2001. The results based on unbalanced dynamic panel data models show that import substitution has no productivity enhancing impact in manufacturing industries both in South Korea and Turkey. However, the results depict that import substitution effects positively industrial competitiveness in these two countries between the years 1981 and 2001. While industrial competitiveness is a positive function of both labour productivity and import substitution in Korean manufacturing, there doesn't seem to be a significant impact of productivity on competitiveness in Turkish manufacturing. Competitiveness of Turkish manufacturing industry is closely related with exchange rates rather than productivity.

The paper is organised as follows: In the next section, we discuss theoretical background of the relation between import substitution, productivity and industrial competitiveness. We analyse the evolution of labour productivity in Korean and Turkish manufacturing industries and make some basic comparisons in section three. In section four, the relations of import substitution, productivity and competitiveness in Korean and Turkish manufacturing examined descriptively. Section five presents and discusses the estimated econometric models. Finally, we conclude in the last section.

2. THEORETICAL ASPECTS OF IMPORT SUBSTITUTION AND INDUSTRIAL COMPETITIVENESS

Definitions of the terms "import substitution", "protection" and "promotion" date back to the debates on developing-country trade policies in the second half of nineteenth century. The general aim was to build an economy that was flexible and diversified enough to overcome crises, create real and continuous growth opportunities, and generate welfare for the population.

Since the second half of nineteenth century, when the terminology of import substitution (IS) appears, there has been a wide range of literature defining IS differently. According to Diaz-Alejandro (1975), IS takes place when the import share of the total supply of a specific good shrinks relative to that of domestic production, either because of new tariffs levied on imports of that product, or because of devaluation which raises import prices or for other reasons.

IS based on protection is "likely to induce foreign firms to set up local production facilities to satisfy the demand previously satisfied by exports from their home country, rather than to create

[1] See Celasun and Rodrik (1989), Krueger and Aktan (1992), Önis and James (1993) and Yilmaz (2002) for the experience of industrialisation policy of Turkey.
[2] See Dornbusch and Park (1987), Krueger (1987), Lee (1994) and Yilmaz (2002) for evaluation of Korean industrialisation policy.

a domestically owned and operated industry capable of competing successfully with its foreign rivals" (Johnson, 1964). This definition indeed refers to import-competing industry. Although there seems to be no direct relation between import competing and import substituting industries, import competing is the first step to begin to substitute imported goods.

In this paper, we define "import substitution" as replacing of imports of some commodities by domestic production. This may bring about two main positive impacts to the national economy: one is stabilization of trade balance and international activities by decreasing imports. The second is the growth in overall production, value added and competitiveness by building production facilities inside the country (Bruton, 1985).

In implementing a development strategy, one of the main aims would be building a strong competitive production structure. As it mentioned by Bruton (1985), one of the advantages of IS strategy is enhancing industrial competitiveness. However, the implementation of such strategy should be made in short period of time. Import substitution fails in the long-run because it creates an environment that discourages learning (Bruton, 1998: 903) According to Balassa (1971), the IS strategy makes possible to attain high rates of economic growth during the period of "easy" IS when imports of nondurable consumer goods and intermediate goods used in their manufacturing were replaced by domestic production in the Republic of China (Taiwan) and Korea. These two countries started out with IS in nondurable consumer goods and their inputs, and they had replaced virtually all such imports in a short period of time, instead of concentrating on IS in intermediate products, machinery and durable consumer goods. They then switched to export-oriented development strategy with established and competitive industries.

When production of intermediates based on available natural resources is developed, such products may reach international competitiveness at an earlier stage if access to low-cost natural resources and a potential for economies of scale exist. IS development type may then be the easiest way to establish a number of industries rapidly and to achieve a relatively high degree of industrialization and competitiveness (Teitel and Thoumi, 1986).

IS strategy implementation does not refer to a simple operation in which certain items are withdrawn from the import basket or their volume reduced, and to be replaced by domestic substitutes. To make IS strategy implementation more effective, production must be increased not only in the industry finally processing the substituting good, but also in its supplier industry and in their suppliers industries.

3. LABOUR PRODUCTIVITY AND IMPORT SUBSTITUTION AND IN KOREAN AND TURKISH MANUFACTURING INDUSTRIES

In this section of the paper we analyse the trends of labour productivity measured as value added per employee in current USD and the impact of IS. Figure 1 depicts that among all industries tobacco and petroleum refineries are the industries with the highest labour productivity in Korean manufacturing. In Turkish manufacturing industry, on the other hand, petroleum refineries have the highest labour productivity rate (see Figure 1). It seems that labour productivity increased significantly in every industry of both countries in the second period. Average growth of labour productivity in Korean and Turkish manufacturing industries are about 472.5% and 241.9%, respectively. Labour productivity in Korean manufacturing had grown almost two times faster than Turkish manufacturing. The figure implies that in the late 1990s Korean industry is about 1.5 times more productive than that of Turkish.

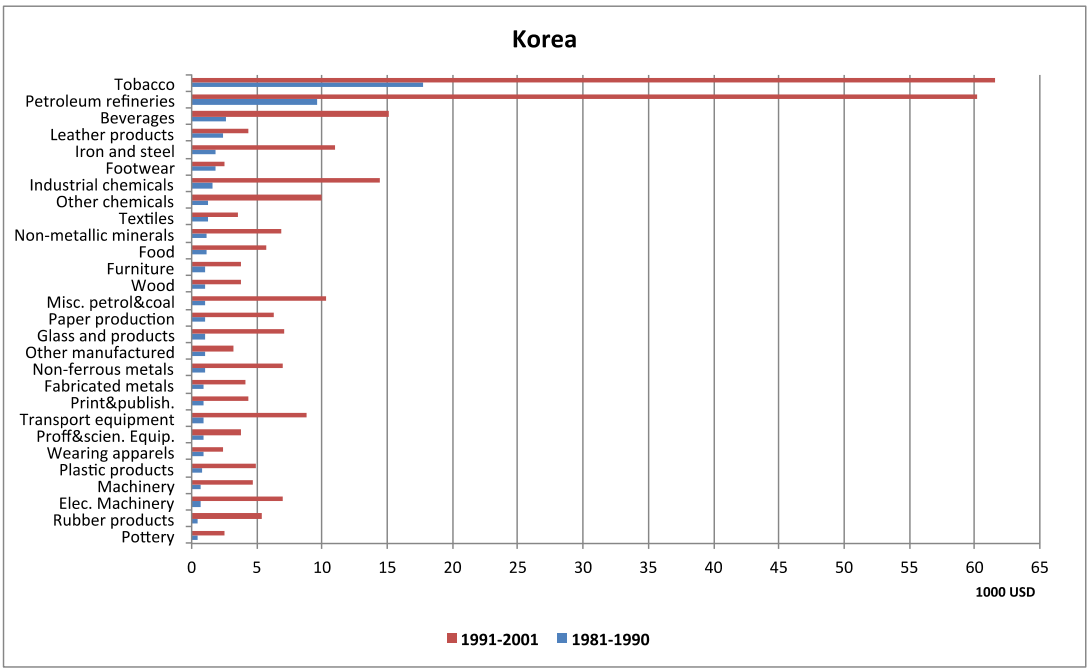

Figure 1.a Labour Productivity of Korean and Turkish Manufacturing Industries at Constant Prices 1981-2001 (ten years average)

Source: *Author calculation based on UNIDO-IS (2013) database.*

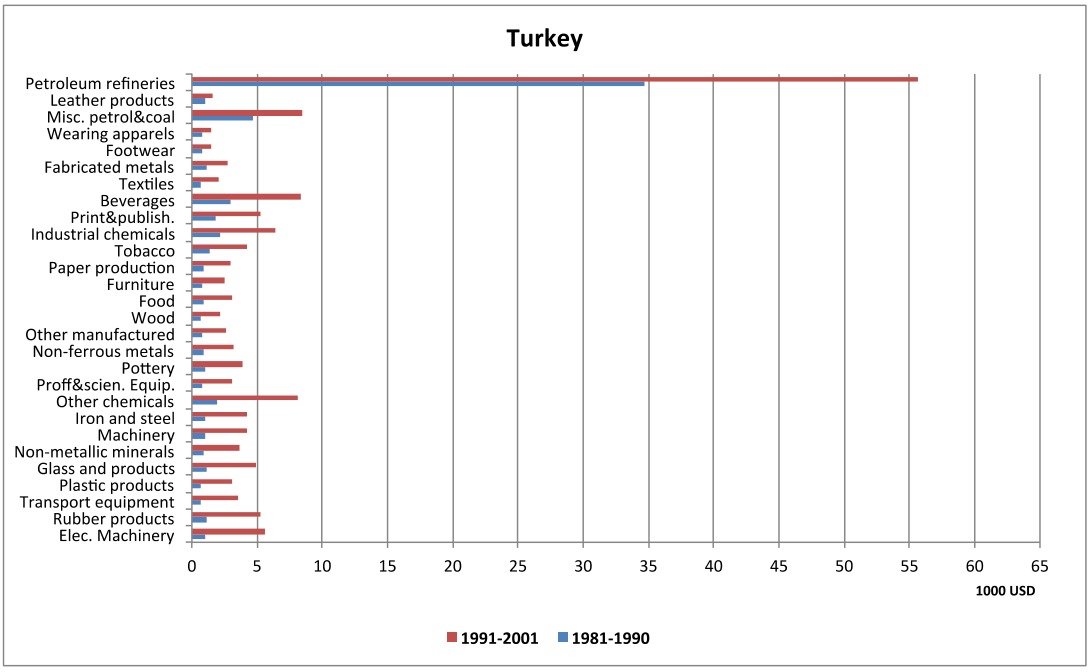

Figure 1.b Labour Productivity of Korean and Turkish Manufacturing Industries at Constant Prices 1981-2001 (ten years average)

Source: *Author calculation based on UNIDO-IS (2013) database.*

Looking to the similarity between Korean and Turkish manufacturing industries as it mentioned above petroleum refineries industry in both countries has highest rate of productivity. Moreover the top 10 industries with respect to volume of labour productivity in both countries seem to be similar. 7 of top 10 industries identical in both countries: Tobacco, petroleum refineries, beverages, industrial chemicals, misc. petrol and coal, other chemicals and glass production.

We also observed the similarity between these two countries with respect to the growth rates. 6 of top 10 fast growing industries in both countries are identical: rubber, electrical machinery, transport equipment, other chemicals, glass products and machinery. Moreover rubber and electrical machinery is at the top of the industries with respect to growth rate in both countries. Among the fast growing industries, both in Korea and Turkey, we see the dominance of high and medium tech industries. Among top 10 fast growing industries, 7 in Korean and 8 in Turkish manufacturing are high and medium tech and industries. In sum, the descriptive analysis shows that both Korean and Turkish manufacturing industries have similar structures yet the growth rates of labour productivity are being different.

In measuring IS, we use the methodology developed originally by Chenery (1960) and adopted by Lewis and Soligo (1965) and Desai (1969). Consider the basic identify:

$$P_{i,t} + M_{i,t} = D_{i,t} + X_{i,t} \qquad (1)$$

where *P*, *M*, *D*, and *X* are domestic production, imports, final domestic demand (including intermediate demand and inventory accumulation), and exports of industry *i* at time *t* respectively.

Equation (1) may be written in difference form as follows:

$$\Delta P_{i,t} + \Delta M_{i,t} = \Delta D_{i,t} + \Delta X_{i,t} \qquad (2)$$

If total supply (*S*) in the economy is equal to the sum of domestic production (P) and imports (M), then equation (2) becomes:

$$\Delta S_{i,t} = \Delta D_{i,t} + \Delta X_{i,t} \qquad (3)$$

Let $s_{i,t_{base}} = \frac{P_{i,t_{base}}}{S_{i,t_{base}}}$ be the share of domestic production in total supply of industry *i* at the base year.

The change in the production of the industry *i* at time *t* may be decomposed into three parts:

$$\Delta P_{i,t} = s_{i,t_{base}} \Delta D_{i,t} + s_{i,t_{base}} \Delta X_{i,t} + (s_{i,t} - s_{i,t_{base}}) \Delta S_{i,t} \qquad (4)$$

In this is the decomposition; the first term on the right hand side of the equation is the contribution of change in total demand, holding the import share constant. The second term is the contribution of the change in exports again assuming that the import share constant. The last term is the contribution of import substitution to the change in domestic output.

Figure 2 presents the share of IS in total domestic production in manufacturing industries of Korea and Turkey respectively. For Turkish manufacturing, the figure depicts that IS is observed in the four of 28 industries in first period (1981-90). In the first period, 0.3% of 7.5 percentage point growth in fabricated metals was due to IS. In the same period, non-ferrous metals, iron and steel, and petroleum refineries grown at 14.4%, 15.3%, and 5.3% with 0.6%, 1.1%, 0.6% IS respectively.

The picture changed dramatically for these industries in the 1990s and the IS turned to negative. The figure depicts that there are five industries showing IS in second period

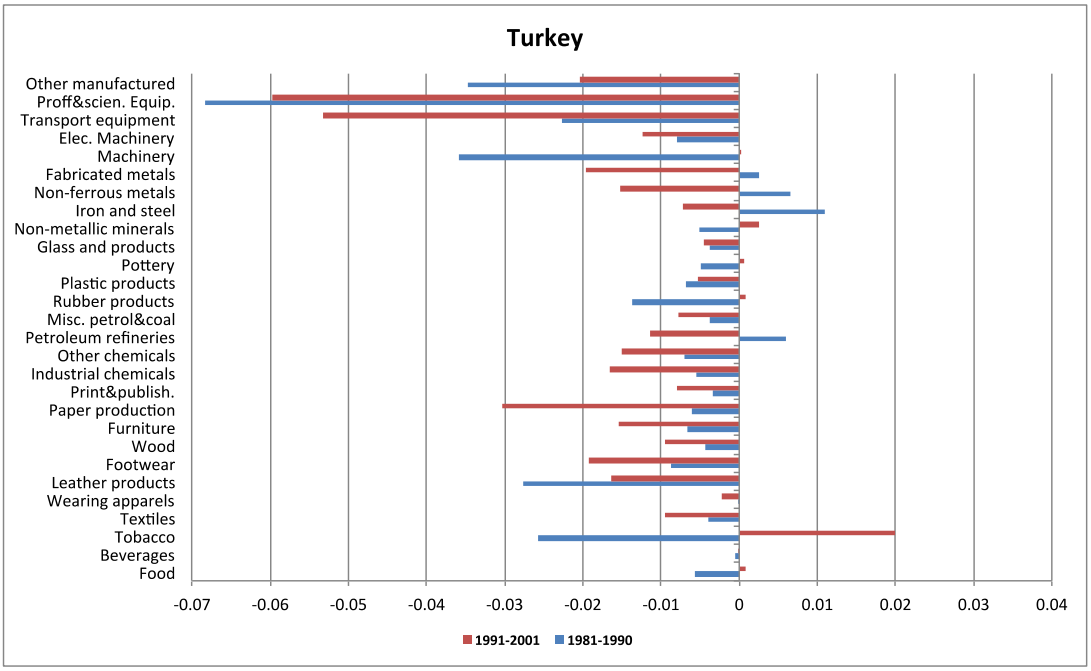

Figure 2.a Share of IS in Total Domestic Production, 1981-2001, (10 year averages)

Source: *Author calculation based on UNIDO-IS (2013) and UNIDO-IDSB (2013) databases.*

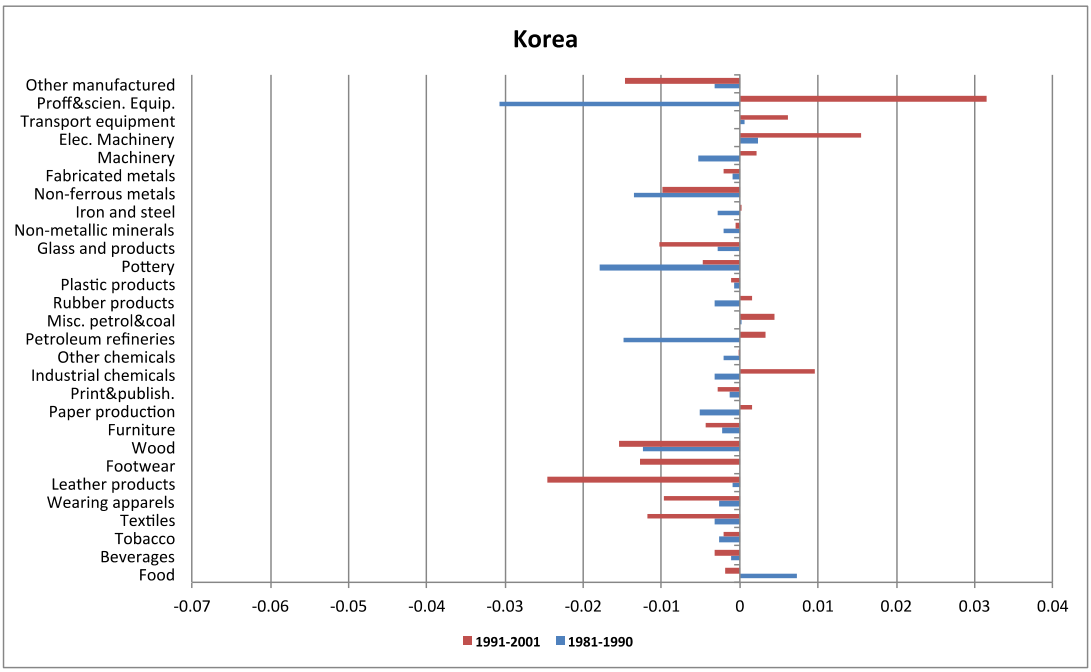

Figure 2.b Share of IS in Total Domestic Production, 1981-2001, (10 year averages)

Source: *Author calculation based on UNIDO-IS (2013) and UNIDO-IDSB (2013) databases.*

(1990-2001) but the numbers are negligible. Only tobacco industry has significant share of IS with 2% during second period.

We found weak evidence of IS in Korean manufacturing in the 1980s: three out of 28 industries. The highest IS was observed in food industry where the share of IS was 0.7% in 8.7% total industry's growth.

The picture, however, is quite different for Korean manufacturing in the second period: IS was observed in 11 industries in Korean manufacturing. We found that one third of 9.4 percentage point growth in proff&scien. equip industry was due to IS. The share of IS in 10.5% growth in the transp. equip. growth was 0.6%. The share of IS in electrical machinery was found to be larger: 1.6% in 5.2% growth. Finally, the contribution of IS to the average growth of 8.6% in industrial chemicals was 1%. Other industries experienced IS in Korean manufacturing during second period were machinery, petroleum refineries, misc. petrol, iron and steel, paper production, rubber, and tobacco.

When the technological structure of import substituting industries in Turkish manufacturing is considered, we observe that import-substituting industries are mostly dominated by low-tech industries. However, in Korean manufacturing, 6 out of 11 import substituting industries are medium-high tech.

4. COMPETITIVENESS IN KOREAN AND TURKISH MANUFACTURING

This section of the paper is devoted to give a general view on the evolution of competitiveness in Korean and Turkish manufacturing during the period under study. Competitiveness is measured as exports (X) divided by imports (M). This is said to be a basic index because it does not consider the volume of trade.

Our findings, in general, show that competitiveness decreased in most industries of the two countries from 1980s to 1990s (see figure 3). Most of the Turkish manufacturing industries had slightly higher competitiveness ratio than that of Korean in the first period. In the second, however, the picture changed due to the sharp decrease in competitiveness of Turkish manufacturing industries. In the first period, 14 out of 28 Turkish manufacturing industries had competitiveness index above 1, i.e. export was exceeding import, while Korean had 17 industries out of 28. For the second period, this number reduced to 11 for Turkish and 13 for Korean manufacturing industries. In the second period, we see a sharp decrease in the competitiveness of top 10 competitive industries of Turkish manufacturing, except wearing apparels. Similar decrease is observed in Korean manufacturing, except footwear. Finally, only one industry, wearing apparels, had competitiveness ratio above 5 Turkish manufacturing, while this ratio was 4 in Korean manufacturing.

With respect to the technological structure both in Korean and Turkish manufacturing, low-tech industries seem to be more competitive. Seven industries among the top 10 competitive industries in Korea were low-tech industries. For Turkish manufacturing, the picture is almost the same: 9 of the top 10 competitive industries were low-tech industries.

Based on our descriptive statistics we can conclude that in both Korean and Turkish manufacturing, the relation between IS and competitiveness had almost been negligible. Our reasoning based on the finding that only 1 import substituting industry in Korean manufacturing is among top 10 competitive industries. The outcome is the same for Turkey: only 1 import substituting industry among the top 10 competitive industries (see figures 2 and 3). The picture of the relationship between competitiveness and labour productivity in both countries is the same as the relation between IS and competitiveness. In Korean manufacturing, only 3 in the top 10 industries with respect to the labour productivity is among top 10 competitive industries, while there is only one industry within this category in Turkish manufacturing industry.

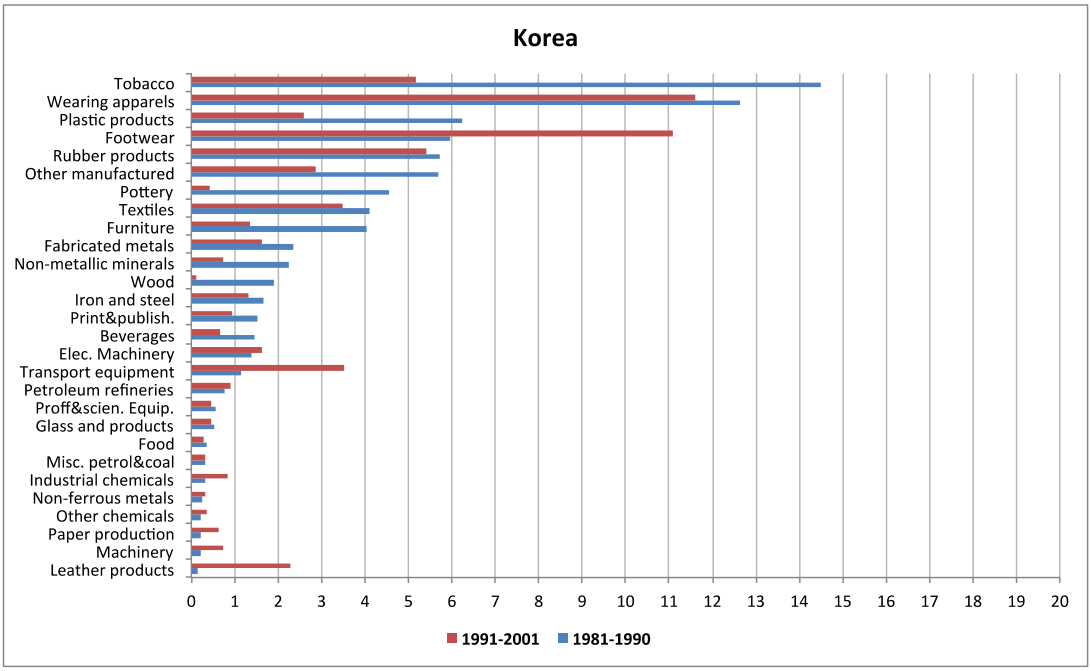

Figure 3.a Competitiveness of Korean and Turkish Manufacturing Industries, 1981-2001 (ten year averages)

Source: *Author calculation based on UNIDO-IDSB (2013) database.*

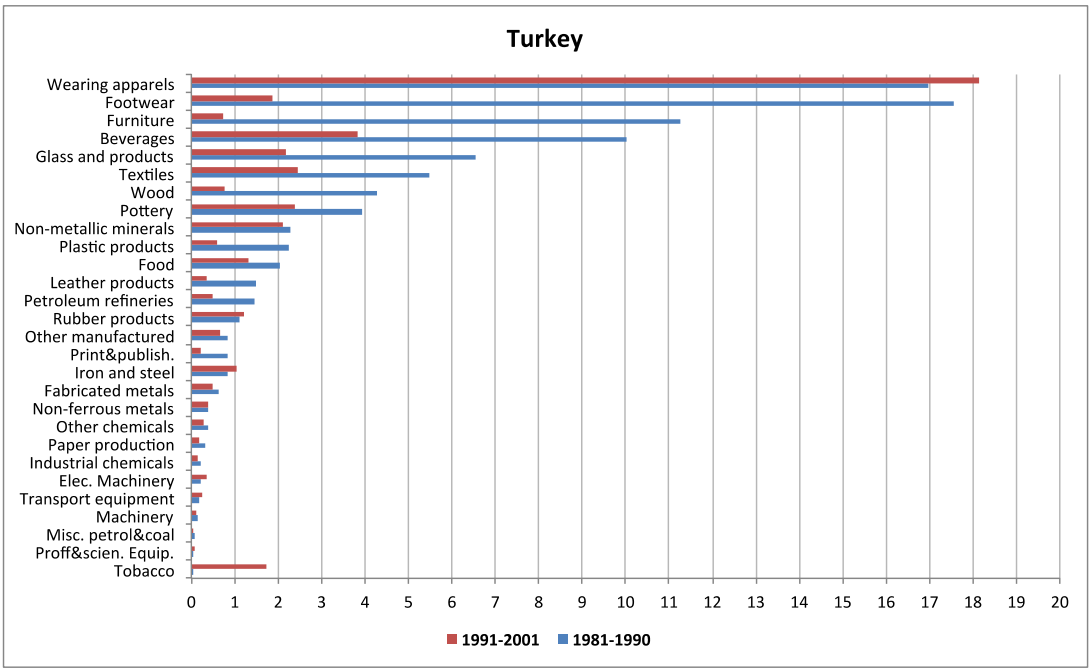

Figure 3.b Competitiveness of Korean and Turkish Manufacturing Industries, 1981-2001 (ten year averages)

Source: *Author calculation based on UNIDO-IDSB (2013) database.*

5. IMPACT OF IMPORT SUBSTITUTION ON INDUSTRIAL COMPETITIVENESS AND LABOUR PRODUCTIVITY

5.1. Data and the Models

The empirical analysis in this paper is based on UNIDO Industrial Statistics (2013) and UNIDO Industrial Demand Supply Balance (2013) databases and covers the period 1981-2001. All monetary variables are in constant US Dollars. In order to test the impact of IS on labour productivity, we used a productivity equation augmented to account for the impact of IS on labour productivity:

$$LP_{i,t} = \beta_0 + \beta_1 LP_{i,t-1} + \beta_2 CAPINT_{i,t} + \beta_3 ISS_{i,t} + \beta_4 WAGEDIFF_{i,t} + \beta_5 EXRATE_t + \mu_t + \varepsilon_{i,t} \quad (1)$$

In order to explore the impact of the import substitution on industrial competitiveness, we use a standard linear equation augmented to account for the impact of the import substitution and other control variables:

$$C_{i,t} = \beta_0 + \beta_1 C_{i,t-1} + \beta_2 LP_{i,t} + \beta_3 ISS_{i,t} + \beta_4 WAGEDIFF_{i,t} + \beta_5 EXRATE_t + \mu_t + \varepsilon_{i,t} \quad (2)$$

In equation (1) and (2), *LP*, *CAPINT*, *ISS*, *WAGEDIFF* and *EXRATE* are labour productivity, capital intensity, import substitution, wage differential and official exchange rate variables respectively. *i* and *t* denote industry and time period, and μ_t control for time. Finally $\varepsilon_{i,t}$ is the usual error term.

Labour productivity (*LP*) is measured as the logarithm of manufacturing value added per employee at constant prices.

Capital intensity (*CAPINT*) is the logarithm of real manufacturing capital stock per employee. Capital stock series for each industry is calculated by using perpetual inventory method with 7.5% depreciation rate.

ISS measured as share of import substitution in total domestic production. The coefficient of import substitution in competitiveness model is expected to be positive.

WAGEDIFF is the wage difference of Korean and Turkish manufacturing industries from World manufacturing industries, measured as wages of Korean and Turkish manufacturing industries divided by World manufacturing industries[3].

Competitiveness (*C*) measured as (Export - Import) divided by (Export + Import).

EXRATE is the official exchange rate of the country and measured as USD per Korean Won and Turkish Lira respectively.

Finally, in order to account for partial adjustment in labour productivity and competitiveness, we estimated the dynamic model. The coefficient of the lagged value of the dependent variables $LP_{i,t-1}$ and $C_{i,t-1}$ measures the speed of adjustment and is expected to be positive and less than one.

[3] Calculated as the average of 40 biggest economies of the World.

5.2. The Summary Statistics of the Variables

The summary statistics of the variables used in the estimations and their correlations are reported in Tables 1 and 2. We found that all variables have positive correlation with labour productivity (see Table 2). The highest correlation rate, as expected, observed between labour productivity and capital intensity. The correlation between labour productivity and ISS was found to be positive but the lowest one among all variables. *WAGEDIFF* also shows a positive correlation with labour productivity. The variables related with competitiveness show positive correlations with *C* except labour productivity. Correlation between *C* and *WAGEDIFF* found to be positive which inconsistent with the literature mainstream economics that higher wages related with lower competitiveness of industry. Finally, our results show that *ISS*, *EX_RATE*, *WAGEDIFF* and *CAPINT* have positive correlation among each other.

Table 1: Summary Statistics of the Variables, 1981 – 2001

Variable	Number Obs.	Mean	Std. Dev.
Ln LP	1169	10.05613	1.218569
Ln LP$_{t-1}$	1144	10.03675	1.213956
C	1153	-0.07943	0.532636
C$_{t-1}$	1097	-0.08242	0.536675
CAPINT	1142	8.08866	1.361362
ISS	1104	-0.0072	0.041623
WAGEDIFF	1169	0.372674	0.538083
EX_RATE	1176	8.25E+08	1.62E+09

Source: Author's calculations based on UNIDO-IS (2013) and UNIDO-IDSB (2013) databases.
Note: significant at 5%.

Table 2: Pair Wise Correlations, 1981 – 2001

Variable	*Ln LP*	*Ln LP$_{t-1}$*	*C*	*C$_{t-1}$*	*CAPINT*	*ISS*	*WAGEDIFF*	*EX_RATE*
Ln LP	1							
Ln LP$_{t-1}$	0.815	1						
C	-0.149	-0.141	1					
C$_{t-1}$	-0.159	-0.162	0.937	1				
CAPINT	0.805	0.635	-0.140	-0.152	1			
ISS	0.004	0.022	0.150	0.040	0.024	1		
WAGEDIFF	0.253	0.137	0.224	0.217	0.221	0.006	1	
EX_RATE	0.173	0.071	0.090	0.084	0.329	0.053	0.161	1

Source: Author's calculations based on UNIDO-IS (2013) and UNIDO-IDSB (2013) databases.
Note: significant at 5%.

5.3. Estimation Results

Using fixed-effects model in estimation of the equations (1) and (2) may lead to inconsistent estimation of the coefficients due to existence of lagged dependent variable in these two equations. We, therefore, use the one-step Generalised Methods of Moments (GMM) estimation method proposed by Arrellano and Bond (1991) to explore the relations between import substitution, productivity and competitiveness in this research. This method is suitable for this type of dynamic equations and takes into account of the endogeneity problem.

The estimation results are reported in Tables 3 – 6. Although estimation results are to some extent sensitive to the econometric methodology used, they are generally plausible and robust. We used several combinations of control variables to estimate the effect of IS on labour productivity. The main results on the effect of IS on labour productivity may be summarized as follows (see tables 3-4.):

The capital intensity, *CAPINT*, has a positive effect on labour productivity for both Korean and Turkish manufacturing industries. The estimated value of elasticity of capital in Korean manufacturing is reasonable in low tech (between 0.16–0.27) and medium-high tech (between 0.29–0.36) industries. The coefficient of *CAPINT* is found to be between 0.13–0.16 in low tech and between 0.18–0.25 in medium-high tech industries of Turkish manufacturing. Thus in Korean manufacturing, the elasticity of labour productivity to *CAPINT* is slightly higher in both low and high tech industries than Turkish manufacturing.

The adjustment of labour productivity (lagged labour productivity) found to be positive and less than 1, as expected. The coefficient of the lagged labour productivity variable is higher in Korean manufacturing than in Turkish.

There is a statistically significant and positive relationship between labour productivity and *WAGEDIFF* in low and medium tech industries of Korean manufacturing. The impact of *WAGEDIFF* on labour productivity is also positive in Turkish manufacturing but not statistically significant in low-tech industries. This coefficient was found to be positive and significant in medium-high tech industries. This implies that cross-industry wage differences helps to enhance labour productivity in medium-high tech industries in Turkish manufacturing.

We found that there is a negative and statistically significant relation between import substitution, ISS, and labour productivity in both Korean and Turkish manufacturing industries. This implies that import substitution, in fact, did not help to increase in labour productivity in manufacturing industries of Korea and Turkey between the years 1981 and 2001.

The results show that exchange rates are negatively associated with labour productivity in low and medium-high technology intensive industries of Korean and Turkish manufacturing industry.

The findings on the relation between industrial competitiveness and imports substitution and the other control variables may be summarized as follows (see table 5-8.):

There is statistically significant and positive relation between industrial competiveness and ISS in Korean and Turkish manufacturing for both low and medium-high tech industries. This implies that import substitution enhances competitiveness of an industry.

The findings on the relation between labour productivity and competitiveness show differences in these two economies: while labour productivity has a positive and significant impact on industrial competitiveness in Korean low and medium-high tech manufacturing industries, it has negative impact in low tech industries of Turkish manufacturing. Thus, according to our findings, the significant impact of labour productivity on industrial competitiveness observed in Korean manufacturing. It seems that in Turkey competitiveness of an industry depends on the factors other than productivity.

The relationship between industrial competiveness and *WAGEDIFF* in two different technology intensive industries of Korea turned out to be insignificant in most of the estimated models. This means that competitiveness of Korean manufacturing industry does not depend on low wages. In Turkey, on the other hand, while the relation between competitiveness and *WAGEDIFF* is found to be positive in low-tech industries, the relation found to be insignificant in medium-high-tech industries. These finding may imply that competitive

Table 3: Determinants of Labour Productivity in Korea and Turkey, Low-tech Industries, 1981-01. (*GMM model, the dependent variable is labour productivity*)

	KOREA			
VARIABLES	Model A	Model B	Model C	Model D
Ln LP$_{t-1}$	0.557**	0.613**	0.537**	0.489**
	[0.072]	[0.078]	[0.052]	[0.038]
CAPINT	0.258**	0.270**	0.173**	0.164**
	[0.050]	[0.052]	[0.048]	[0.049]
ISS	-2.373**	-2.520**	-0.718**	-0.609*
	[0.638]	[0.627]	[0.258]	[0.270]
WAGEDIFF	0.086*			0.075**
	[0.042]			[0.022]
EX_RATE			-0.001**	-0.001**
			[0.000]	[0.000]
Constant	0.020**	0.011	0.059**	0.067**
	[0.007]	[0.007]	[0.011]	[0.010]
# of obs.	326	326	326	326
# of industries	18	18	18	18
F-Stat	362.9	371.3	352.0	372.2
A – B1	-3.287	-3.277	-2.804	-2.728
A – B2	-2.383	-2.483	-0.640	-0.948

	TURKEY			
VARIABLES	Model A	Model B	Model C	Model D
Ln LP$_{t-1}$	0.460**	0.461**	0.372**	0.368**
	[0.074]	[0.077]	[0.070]	[0.063]
CAPINT	0.158**	0.159**	0.133**	0.131**
	[0.027]	[0.027]	[0.027]	[0.028]
ISS	-0.727*	-0.715*	-0.617*	-0.631*
	[0.322]	[0.312]	[0.292]	[0.305]
WAGEDIFF	0.024			0.063
	[0.127]			[0.137]
EX_RATE			-0.536**	-0.544**
			[0.174]	[0.171]
Constant	0.039**	0.039**	0.064**	0.064**
	[0.009]	[0.009]	[0.010]	[0.010]
# of obs.	326	326	326	326
# of industries	18	18	18	18
F-Stat	37.94	35.42	42.38	40.17
A – B1	-3.343	-3.390	-3.424	-3.339
A – B2	0.819	0.842	0.775	0.711

Notes: Regressions include time dummies. Robust standard errors in brackets.
****significant at 10%; * significant at 5% ** significance at 1%*
A-B1: Arellano-Bond test that average auto covariance in residuals of order 1 is 0.
A-B2: Arellano-Bond test that average auto covariance in residuals of order 2 is 0.

Table 4: Determinants of Labour Productivity in Korea and Turkey, Medium-high Tech Industries, 1981-01. (*GMM model, the dependent variable is labour productivity*)

	KOREA			
VARIABLES	Model A	Model B	Model C	Model D
Ln LP_{t-1}	0.438**	0.518**	0.478**	0.426**
	[0.067]	[0.069]	[0.068]	[0.062]
CAPINT	0.354**	0.359**	0.292**	0.304**
	[0.049]	[0.052]	[0.050]	[0.051]
ISS	-1.505**	-1.737**	-1.115**	-1.103**
	[0.162]	[0.148]	[0.185]	[0.187]
WAGEDIFF	0.299*			0.245*
	[0.118]			[0.120]
EX_RATE			-0.001**	-0.001**
			[0.000]	[0.000]
Constant	0.026**	0.016***	0.049**	0.048**
	[0.008]	[0.009]	[0.016]	[0.012]
# of obs.	190	190	190	190
# of industries	10	10	10	10
F-Stat	519.2	292.6	299.7	410.1
A – B1	-2.746	-2.721	-2.731	-2.778
A – B2	-0.0121	-0.0353	-0.832	-0.859

	TURKEY			
VARIABLES	Model A	Model B	Model C	Model D
Ln LP_{t-1}	0.463**	0.523**	0.430**	0.328**
	[0.049]	[0.033]	[0.049]	[0.066]
CAPINT	0.223**	0.247**	0.217**	0.177**
	[0.057]	[0.059]	[0.052]	[0.049]
ISS	-0.699**	-0.616*	-0.483*	-0.551**
	[0.221]	[0.250]	[0.233]	[0.195]
WAGEDIFF	2.266***			2.707*
	[1.178]			[1.150]
EX_RATE			-0.528**	-0.675**
			[0.196]	[0.192]
Constant	0.035**	0.034**	0.064**	0.073**
	[0.008]	[0.009]	[0.007]	[0.008]
# of obs.	190	190	190	190
# of industries	10	10	10	10
F-Stat	100.8	90.18	66.64	89.96
A – B1	-2.970	-2.863	-2.894	-2.916
A – B2	1.713	2.104	2.098	1.051

Notes: Regressions include time dummies. Robust standard errors in brackets.
****significant at 10%; * significant at 5% ** significance at 1%*
A-B1: Arellano-Bond test that average auto covariance in residuals of order 1 is 0.
A-B2: Arellano-Bond test that average auto covariance in residuals of order 2 is 0.

Table 5: Determinants of Competitiveness in Korea and Turkey, Low-tech Industries, 1981-01. (*GMM model, the dependent variable is competitiveness*)

	KOREA				
VARIABLES	Model A	Model B	Model C	Model D	Model E
C_{t-1}	0.816**	0.816**	0.820**	0.824**	0.845**
	[0.076]	[0.078]	[0.064]	[0.065]	[0.055]
ISS	1.366*	1.364*	1.541*	1.619*	2.028**
	[0.679]	[0.680]	[0.682]	[0.697]	[0.775]
Ln LP	0.088**	0.094**			-0.022
	[0.032]	[0.022]			[0.028]
WAGEDIFF	0.006		0.033**		
	[0.014]		[0.010]		
EX_RATE	0.001**	0.001**	0.001**	0.001**	
	[0.000]	[0.000]	[0.000]	[0.000]	
Constant	-0.026**	-0.027**	-0.010**	-0.008*	0.002
	[0.006]	[0.005]	[0.003]	[0.004]	[0.003]
Observations	324	324	324	324	324
Number of industries	18	18	18	18	18
F-Stat	106.8	105.7	412.0	264.3	178.7
A – B1	-1.753	-1.753	-1.757	-1.758	-1.812
A – B2	-1.223	-1.231	-1.055	-1.032	-1.161

	TURKEY				
VARIABLES	Model A	Model B	Model C	Model D	Model E
C_{t-1}	0.684**	0.707**	0.687**	0.706**	0.712**
	[0.067]	[0.074]	[0.064]	[0.071]	[0.075]
ISS	2.345**	2.407**	2.374**	2.421**	2.426**
	[0.527]	[0.544]	[0.526]	[0.528]	[0.556]
Ln LP	-0.036	-0.032			-0.050
	[0.035]	[0.036]			[0.036]
WAGEDIFF	0.148*		0.145*		
	[0.061]		[0.056]		
EX_RATE	0.077***	0.060	0.103*	0.081***	
	[0.043]	[0.041]	[0.043]	[0.042]	
Constant	-0.004	-0.001	-0.008	-0.005	0.003
	[0.006]	[0.006]	[0.005]	[0.006]	[0.003]
Observations	324	324	324	324	324
Number of industries	18	18	18	18	18
F-Stat	60.50	67.52	78.82	106.7	66.45
A – B1	-2.683	-2.565	-2.731	-2.612	-2.550
A – B2	-0.257	-0.122	-0.303	-0.167	-0.0999

Notes: Regressions include time dummies. Robust standard errors in brackets.
****significant at 10%; * significant at 5% ** significance at 1%*
A-B1: Arellano-Bond test that average auto covariance in residuals of order 1 is 0.
A-B2: Arellano-Bond test that average auto covariance in residuals of order 2 is 0.

Table 6: Determinants of Competitiveness in Korea and Turkey, Medium-High Tech Industries, 1981-01. (*GMM model, the dependent variable is competitiveness*)

	KOREA				
VARIABLES	Model A	Model B	Model C	Model D	Model E
C_{t-1}	0.779**	0.791**	0.833**	0.818**	0.829**
	[0.059]	[0.058]	[0.067]	[0.064]	[0.063]
ISS	1.036**	1.052**	1.309**	1.131**	1.309**
	[0.285]	[0.274]	[0.265]	[0.269]	[0.266]
Ln LP	0.114**	0.119**	0.033*		0.031***
	[0.026]	[0.025]	[0.016]		[0.016]
WAGEDIFF	0.026		-0.010	0.051**	
	[0.037]		[0.030]	[0.016]	
EX_RATE	0.001**	0.001**		0.001*	
	[0.000]	[0.000]		[0.000]	
Constant	-0.025**	-0.025**	-0.001	0.001	-0.001
	[0.007]	[0.007]	[0.003]	[0.004]	[0.002]
Observations	190	190	190	190	190
Number of industries	10	10	10	10	10
F-Stat	146.1	204.8	347.8	187.5	225.0
A – B1	-2.171	-2.190	-2.282	-2.254	-2.271
A – B2	1.250	1.253	0.800	1.066	0.756

	TURKEY				
VARIABLES	Model A	Model B	Model C	Model D	Model E
C_{t-1}	0.433**	0.437**	0.491**	0.466**	0.496**
	[0.127]	[0.119]	[0.102]	[0.095]	[0.091]
ISS	0.472**	0.460**	0.583**	0.472**	0.572**
	[0.152]	[0.158]	[0.156]	[0.149]	[0.160]
Ln LP	0.089	0.058	0.011		-0.015
	[0.072]	[0.075]	[0.054]		[0.054]
WAGEDIFF	-0.700**		-0.639**	-0.408	
	[0.253]		[0.187]	[0.269]	
EX_RATE	0.207*	0.201*		0.137**	
	[0.088]	[0.094]		[0.052]	
Constant	-0.013	-0.011	0.004	0.000	0.005
	[0.012]	[0.013]	[0.007]	[0.003]	[0.007]
Observations	190	190	190	190	190
Number of industries	10	10	10	10	10
F-Stat	20.63	25.92	15.22	19.68	20.32
A – B1	-1.852	-1.865	-1.672	-1.696	-1.674
A – B2	1.036	1.005	0.979	0.984	0.951

Notes: Regressions include time dummies. Robust standard errors in brackets.
****significant at 10%; * significant at 5% ** significance at 1%*
A-B1: Arellano-Bond test that average auto covariance in residuals of order 1 is 0.
A-B2: Arellano-Bond test that average auto covariance in residuals of order 2 is 0.

ness in medium-high tech manufacturing industries in Turkey does not depend on wage difference. The finding on the relation between competitiveness and wage differentials may also be misleading due to possible correlation between LP and wages, because high productivity sectors pay higher wages.

Finally, the estimation results show that exchange rate is a significant determinant of competitiveness in both countries. We found positive and significant coefficient of exchange rates in both low and medium-high tech industries of both Korea and Turkey.

6. CONCLUSIONS

This paper examines the impact of import substitution on industrial competitiveness and labour productivity in Korean and Turkish manufacturing industries.

Our findings show that Turkey has really left import substitution after 1980s. We found some degree of import substitution in 3-4 industries out of 28 manufacturing industries. However the shares of import substitution in these industries is found to be quite small except tobacco industry. The findings on import substation in Korean manufacturing are not different than Turkey especially in the 1980s. We found weak evidence of IS in three out of 28 industries in Korea in 1980s.

The picture, however, is quite different in the 1990s: Our results show evidence of import substitution in 11 industries of Korean manufacturing. We found significant share of import substitution in total production of professional and scientific equipment, transportation equipment, electrical machinery, miscellaneous petroleum products, industrial chemicals industries and petroleum refineries.

Our dynamic panel data estimation results showed that import substitution did not enhance labour productivity in manufacturing industry of both Korea and Turkey in1980s and 1990s. On the other hand, we found that import substitution affects industrial competitiveness positively in both Korea and Turkey. Furthermore, the impact of import substitution holds both in low and medium-high technology intensive industries.

Apart from the positive impact of import substitution on competitiveness, we also found in this study that while Korean manufacturing industry competitiveness is closely associated with labour productivity, competitiveness of Turkish manufacturing industry depends on the other factors such as exchange rates, wage differentials rather than labour productivity.

The findings of this study allow us drive a few important policy proposals for Turkish manufacturing industry: Although this study finds no association between labour productivity and import substitution, it confirms that import substitution enhances industrial competitiveness. Therefore, conditional and transitory support of domestic production of some medium and high technology intensive products being imported may affect both manufacturing competitiveness and foreign trade balance of Turkey positively. In other words, while promoting manufacturing exports on the one hand, production of medium and high technology intensive capital goods domestically should be promoted. This will contribute the growth of Turkish economy in a sustainable and healthy way.

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