

Does Import Competition Lower Number of Labor and Wage? Evidence from Indonesia's Textile Industry and Apparel Industry

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Abstract—One of the oldest propositions in economics is that import competition brings pressure on employment and wage. Based on this proposition, workers in Indonesia, particularly those of textile industry and apparel industry claim that import competition has reduced the number of labor and wage. This study, using panel data of both industries over the period between 1989 and 1998, is intended to find empirical evidence whether this claim has solid ground. The results confirm the proposition. Yet, the magnitude of the impact is so trivial.

Keywords: *Import competition; employment; wage; textile industry; apparel industry; Indonesia*

I. INTRODUCTION

ASEAN-China Free Trade Agreement has already been implemented at the dawn of this year. Indonesia, as one of ASEAN countries, will open its economy wider and will definitely get more involved in liberalized trade. Actually, ASEAN-China Free Trade Agreement is just another milestone in Indonesia's journey toward free trade. Trade liberalization in Indonesia had been initiated when ASEAN countries launched ASEAN Free Trade Agreement (AFTA) in 1992. Then, it was continued by the accession of Indonesia in the World Trade Organization (WTO) in 1995. In the near future, the journey will also be celebrated with Korea-ASEAN Free Trade Agreement and Japan-Indonesia Economic Partnership Agreement.

Conventional wisdom which is held by international agencies such as WTO, World Bank and IMF, claims that trade liberalization brings benefits to all countries. It is believed that comparative advantage drives every country to specialize. Each country then produces and exports goods which it has comparative advantage. At the same time, it abandons production and imports goods which it has comparative disadvantage. Consequently, production in all countries will achieve economies of scale and goods will be distributed at broader market worldwide. Free trade means more profit for all.

However, many economists argue that trade liberalization also bring severe risks. Free trade also means tougher competition. Some industries which have comparative disadvantage may be driven out of business and workers may be displaced. It is true that other industries will flourish and will absorb labor and capital expelled from collapsed Industries. Yet, this transfer, if possible, will be costly as well as painful.

Many people in Indonesia believe that the textile industry and apparel industry is the most vulnerable industry due to freer trade. The main reason is that they have not been fully recovered from the 1998 economic crisis. Even banks are still reluctant to provide loan for them since they are considered high risk. Another reason is that they still struggle in restructuring old machinery. There has already been an escalating tension demanding for higher protections. Factory owners and workers allege that import competition has already hurt these industries underlining the fact that some factories have been closed and workers lost their jobs.

In fact, the government considers these industries as two of the most important industries. They are labor-intensive industries which help the government in reducing unemployment and poverty. They also have helped the government in maintaining a healthy foreign exchange reserve through exports. Undoubtedly, the government faces a dilemma. It has to protect the welfare of its people while at the same time it is bound by its commitment on trade liberalization. Hence, hard evidence is needed that import competition has harmed employment and wage before the government could employ tighter protection policy. Unfortunately, there is no solid evidence that import competition has already hurt employment and wages. Study on this subject in Indonesia has not been done before. Even similar studies conducted elsewhere (mostly in the U.S.) provide mixed results. This study, therefore, is intended to provide empirical evidence which can support the hypothesis which states that import competition does affect employment and wages in textile and apparel industry.

II. THEORETICAL MODEL

The relationship among import competition, employment and wage can be demonstrated through supply and demand models below. If domestic textile and apparel market is an autarky economy, the equilibrium price P_d of textile and apparel are determined by quantity supplied and quantity demanded at Q_1 . Thereafter, when domestic textile and apparel market is connected to the world textile and apparel market, domestic price will equalize with world price P_w following the law of one price. In the case of import competition world price P_w is lower than domestic price P_d . Thus, domestic price will decrease. Consequently, consumers rise textile and apparel demand from OQ_1 to OQ_2 . Producers, however, reduce their supply from OQ_1 to

OQ3. The disparity between risen demand and reduced supply, Q3 to Q2, is filled up by imports.

The impact of import competition is then passed on to labor market. Labor demand is derived from products demand. When products demand raises labor demand rises, and vice versa. The impact of the fall of products demand shifts the labor demand curve to the left. Accordingly, both employment and wage fall. The model shows employment falls from OL1 to OL2 and wage falls from OW1 to OW2. By using these models, it can be presumed that import competition will make employment and wage fall.

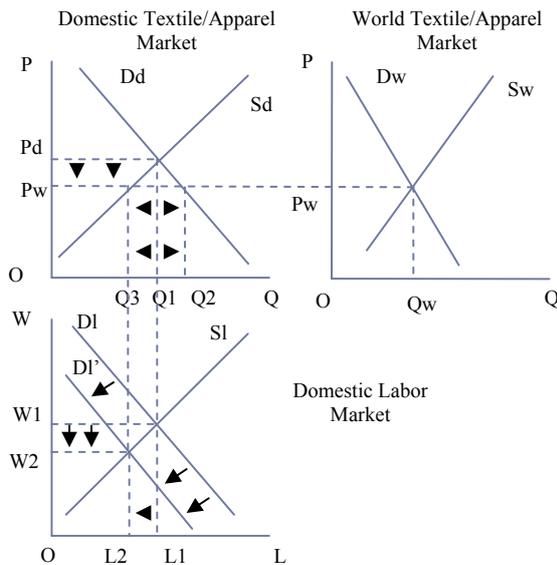


Figure 1. Supply and demand model connecting world textile and apparel market and domestic labor market.

III. LITERATURE REVIEW

Studies on the impact of import competition on employment and wage have been done by many scientists since a while ago. Although these previous studies do not arrive at the same conclusion, they provide important stepping-stones for this study.

Salant (1960) demonstrates the short-run effects on domestic employment of unilateral reductions of United States import barriers. Salant expresses the coefficients relating employment effects to import increases as numbers of employees per million-dollar increase of imports. Observation is made on products of 72 industries using 1953 price. Salant concludes that the gross decreases of employment resulting from the decrease of domestic output have a median value of 115 employees per million-dollar increase of imports.

Grossman (1982) develops a method to determine the extent to which import competition has been responsible for labor displacements and wage movements in specific, allegedly trade-impacted sectors. His method involves econometric estimation of reduced-form, industry-level, and wage and employment equations. This study observes nine manufacturing sectors in the United States using monthly

data from 1969 through 1979. The result indicates that wages are not very sensitive to import competition, whereas the responsiveness of employment varied widely across sectors.

Revenga (1992) investigates the impact of increased import competition on employment and wages in U.S. manufacturing. The theoretical framework used by Revenga states that a change in import competition that shifts industry product demand will shift employment in the same direction, with wage adjustments dampening the employment response. Revenga uses OLS, 2SLS and IV method. For industry import price variable, Revenga uses a quarterly fixed-weight Laspeyres index of transactions prices based on a 1980 import market basket. As measures of industry employment Revenga uses (1) the number of production workers and (2) average person-hours per week. For the wage variable Revenga uses average hourly earnings for production workers, and it also uses (1) average hourly earnings in services and (2) average hourly earnings in trade as different measures of the alternative wage. For capturing cyclical fluctuations in demand, two aggregate measures are used: (1) the aggregate quarterly unemployment rate and (2) quarterly real GDP. Revenga finds changes in import prices have a significant effect on employment and wages. Revenga also offer a useful insight on methodology that OLS estimates seem to be significantly downward biased.

Suarez (1998) examines the effect of international competition on employment and wages in seven Swiss manufacturing sectors from 1966 to 1986. Suarez uses the seemingly unrelated regression method which account for correlation between error terms. Suarez concludes that a majority of the estimated coefficients reflects a negative impact of import competition but the main result is that all the elasticities are of relatively small magnitude.

Shippen (1999) examines the effects of import competition on employment and wages in U.S. textiles and apparel industry by using two models. In the first, the U.S. is considered as a price taker and following Grossman (1986) OLS is used. In the second model, the U.S. is assumed as a price-setter and following Revenga (1992) 2SLS is used. The results are mixed. The results of the OLS suggest foreign competition play a significant role in determining employment and hours worked in apparel industry. Textile industry, however, is not significantly affected by import prices in hour worked, employment, or wages. The results from the 2SLS using weighted exchange rates to instrument the index import price variable are more consistent with these results, although standard errors are large. Indeed, the coefficients of the import price variable with respect to employment and hours are larger in these estimations for both industries than in the OLS but are not significant. The results of import competition on wages for the 2SLS were small and insignificant.

Oscarsson (2000) examines the effect of import competition on employment and wages in 63 industries within Swedish manufacturing sector during 1975-93. As variables representing employment and wages, Oscarsson uses number of production workers, number of hours worked by production workers, number of non-production workers, wage sum for production workers (excluding payroll taxes),

and wage sum for non-production workers excluding payroll taxes. Oscarsson also introduces a one-year long of lag. Oscarsson uses GLS assuming the variances of the observations are unequal (heteroscedasticity). In order to take away inflationary trend, Oscarsson divides all nominal prices by the CPI. Oscarsson concludes that import competition had a significant negative effect on the employment of both production and non-production workers.

Oskooee and Chakrabarti (2000) examine if employment and wages in the U.S. manufacturing sector exhibit any long run relationship with import competition by using cointegration analysis. Their results are mixed. The overall cointegration analysis supports the results reported in Revenga's (1992) panel study. Yet it indicates that in the long run a positive correlation between import price and employment and/or a negative correlation between import price and wage are sector sensitive.

Tomiura (2001) examines the impact of imports on labor demand in 390 Japanese manufacturing industries. Tomiura uses IV as wage, import price and import share are considered endogenously determined. Tomiura also uses OLS for comparison to IV. Tomiura concludes that Japanese employment is significantly responsive to import price changes and that the employment sensitivity varies positively depending on the industry import share

Joo (2002) examines the impact of increasing import competition on employment and wages. Joo uses aggregated annual data of 28 ISIC three digit manufacturing industries in Hong Kong, South Korea, Singapore and Taiwan. Mainly based upon Revenga's work, Joo's empirical analysis includes 2SLS, OLS and IV (weighted producers' price as instrumental variables). This study finds both employment and wages are relatively sensitive to increasing import shares. This study also discovers the largest decline in employment and wages is experienced by low capital-intensive industries. Moreover, Joo also reveals that OLS estimates show the existence of endogenous problem between import shares, employment and wages.

Chakrabarti (2003) examines whether employment and wages in the US manufacturing sector exhibit any long-run relationship with import competition by using a multivariate panel cointegration analysis. Chakrabarti observes 12 two digit SIC manufacturing industries from the 3rd quarter of 1982 to the 4th quarter of 1992. The result indicates US manufacturing employment does not bear a long-run relationship with import competition but manufacturing wage does. While the long-run correlation between import price and manufacturing wage is found to be sector sensitive panel estimation reveals a highly significant negative correlation between import price and manufacturing wage.

Sasaki (2007) analyzes the effects of import competition on the labor market in Japan by focusing on the relationship between import prices and manufacturing employment. Sasaki uses dynamic GMM to avoid problems stemming from simultaneity bias. Sasaki finds out employment declines by approximately 0.6 percent in the short run for each percent of import price decline. Sasaki concludes import competition should be considered as an important cause for the severe employment condition since the 1990s.

IV. REGRESSION MODEL

The model used for calculating the impact of import competition on employment and wage in textile and apparel industry is similar to Revenga (1992), Oskooee and Chakrabarti (2000), Joo (2002) and Chakrabarti (2003). Basically, the model is also similar to Shippen (1999), yet Shippen does not include price of the import good.

Labor demand is defined as a linear function of industry wage, vector of observable factors which shift the labor demand and domestic price of the import goods. This function can be written as,

$$d\ln L_{it} = dZ_{it} \Lambda - \theta_2 d\ln W_{it} + \theta_1 d\ln Pm_{it} + w_{1it} \quad (1)$$

Where L_{it} is labor demand for industry i and year t , Z_{it} is a vector of observable factors which shift the labor demand in industry i and year t , Λ is a vector of parameters which corresponds to Z_{it} , W_{it} is the industry wage, Pm_{it} is the domestic currency price of the import good, and w_{1it} is an error term indicating unmeasured labor demand shocks.

Similarly, labor supply is defined as a linear function of vector of observable factors which shift the labor supply and the industry wage. This function can be written as,

$$d\ln L_{it} = dH_{it} \Phi + c d\ln W_{it} + w_{2it} \quad (2)$$

Where L_{it} is labor supply for industry i and year t , H_{it} is a vector of observable factors that shift labor supply, W_{it} is the industry wage, c is labor supply elasticity with respect to wage, Φ is a vector of parameters which corresponds to H_{it} , and w_{2it} reflects other unmeasured labor supply shocks.

Number of labor and wage are endogenous variables in both structural form equation (1) and (2). Knowing that in equilibrium condition with market clearing labor supply equals labor demand; reduced forms can be made by extracting number of labor and wage out of equation (1) and (2). Reduced forms which are created from both structural form equation (1) and (2) above are:

$$d\ln L_{it} = \gamma_1 dZ_{it} \Lambda + \gamma_2 d\ln Pm_{it} + \gamma_3 dH_{it} \Phi + u_{it} \quad (3)$$

$$d\ln W_{it} = \beta_1 dZ_{it} \Lambda + \beta_2 d\ln Pm_{it} + \beta_3 dH_{it} \Phi + v_{it} \quad (4)$$

Where L_{it} is number of labor for industry i and year t , W_{it} is wages for industry i and year t , Z_{it} is a vector of observable factors which shift the labor demand, Λ is a vector of parameters which corresponds to Z_{it} , Pm_{it} is the domestic currency price of the import good, H_{it} is a vector of observable factors that shift labor supply, Φ is a vector of parameters which corresponds to H_{it} , and the terms u_{it} and v_{it} represent unmeasured components of number of labor and wage variation, and are combinations of the unmeasured labor demand and labor supply shocks.

V. DATA DESCRIPTION

This study explores the interaction among import competition, number of labor, and wage. As the supply and demand model suggests, import competition will be measured by using the price of imports. The price of imports used in this study is on Cost, Insurance and Freight (CIF) term. Employment is represented by average total number of labor per working day. And, as proxy for wage, average salary of production workers is used. All data are obtained from BPS Statistics Indonesia survey data. Due to 1998 economic crisis which slowed down Indonesia's economy, imports plunged drastically. Consequently, import data starting from 1999 could not be used due to large deviations. Thus, this research uses data ranging from 1989 up to 1998.

Correlating import data and employment and wage data turns out to be a bit tricky since they are arranged under different classification. BPS Statistics Indonesia organizes import data under Harmonized Commodity and Coding System (HS), a commodity classification which is maintained by World Customs Organization. On the other hand, employment and wage data are categorized under International Standard Industrial Classification (ISIC). This is an economic activity classification which is maintained by United Nations Statistics Division. Associating those data is actually challenging since both classifications are revised from time to time. As a starting point, BPS Statistics Indonesia still uses ISIC Rev. 3 up to now. Nonetheless, correspondence table for HS and ISIC does not exist in the literature. Favorably, United Nations Statistics Division provides HS edition 2002 – CPC (Central Product Classification) Ver. 1.1 correspondence table and CPC Ver. 1.1 – ISIC Rev. 3.1 correspondence table. By using those two tables, ISIC Rev. 3.1 – HS 2002 Edition correspondence table can be constructed. The HS 2002 has to be explored up to six digit subheadings to obtain accurate correlation.

With the intention of obtaining the real value of price of imports and wage, data of both variables have to be cleared from the inflationary effect. Following Revenga (1992), this study alters the inflationary effect by turning the price of imports data into an annually fixed-weight Laspeyres index of transactions prices, using 1989 as base year. Also following Revenga (1992) and Oscarsson (2000), wage data is deflated by using CPI. CPI data used for deflating wage data was also obtained from BPS Statistics Indonesia.

The changes in import competition certainly do not affect both employment and wage instantly. It takes some times before the impact of import competition appears on employment and wage. Thus, following Oscarsson (2000), one year time lag is introduced.

VI. REGRESSION RESULTS

The regression was estimated by using 2SLS method, following Revenga (1992) and Shippen (1999), on gretl

1.9.1cvs¹. The results for textile industry and apparel industry are presented in Table I and Table II respectively.

The results demonstrate, consistent with the theoretical framework, that price of imports is correlated positively with number of labor and wage in both industries. The results also show that the magnitude of those correlations is trivial and insignificant. Only regression of price of imports on wage in textile industry shows significant coefficient of 0.365 which means 10 percent increase in price of imports raises 3.65 percent increase in wage.

The regression estimations also reveal standard error which is a measure of how accurate the sample mean when representing the population mean. Generally, the standard errors of all regression estimations are quite trivial. The largest standard error is found on the impact on wage in textile industry (0.0748), but it is still considered as small.

The regression estimations also produce the coefficient of determination. It is revealed that import competition is responsible for a large part of the change in both number of labor and wage in textile industry. The coefficient determination for number of labor and wage in textile industry are 77% and 81% respectively. Nevertheless, import competition can only explain minor portion of the change in apparel industry. Import competition only has the ability to elaborate 39% of number of labor change and 22% of wage change in apparel industry.

Moreover, the regression estimations produce z and p-value which determine the level of significance of the regression. The z and p-value on apparel industry display that the regression estimations is statistically significant. On the other hand, the z and p-value on textile industry exhibit that the regression estimations is statistically insignificant.

Gretl also tests for heteroscedasticity² and test for normality of residual. The asymptotic test statistics of z and p-value prove that heteroscedasticity does not present in all regression estimations. Then, it can be presumed that the use of least square method is appropriate. Furthermore, tests for normality of residual give Chi-square and p-value which prove that error term is normally distributed. It can be said, then, that the regression model has define the proper function for both independent and dependent variable.

TABLE I. 2SLS RESULTS ON TEXTILE INDUSTRY

Import Competition	Employment	Wage
Coefficient	0.0269258	0.365126
Std. error	0.00515845	0.0748644
Z	5.220	4.877
p-value	1.79e-07	1.08e-06
R-squared	0.773840	0.815418
Test for heteroskedasticity		
Z	0.607117	0.079105
p-value	0.543773	0.936949
Test for normality of residual		
Chi-square	1.32676	0.0406447

¹ GNU Regression, Econometric and Time-series Library is a cross-platform software package for econometric analysis published by the Free Software Foundation

² Pesaran-Taylor test

p-value	0.515107	0.979883
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TABLE II. 2SLS RESULTS ON APPAREL INDUSTRY

Import Competition	Employment	Wage
Coefficient	0.0105860	0.0740734
Std. error	0.00564848	0.0496154
Z	1.874	1.493
p-value	0.0609	0.1354
R-squared	0.390725	0.226128
Test for heteroskedasticity		
Z	0.20089	0.242229
p-value	0.840784	0.808603
Test for normality of residual		
Chi-square	1.96537	1.09309
p-value	0.374304	0.578948

VII. CONCLUSION

Previous studies note mixed results on the impact of import competition on employment and wage. This study contributes as supporter to studies which conclude the impact of import competition on employment and wage really exists. These results are consistent with the theoretical framework. It can be summarized that in textile industry and apparel industry import competition affects both employment and wage in negative sense. However, the magnitude of the impact of import competition on both industries is proved to be very small. Additionally, the regression estimations on textile industry are statistically insignificant, while the regression estimations on apparel industry are statistically significant.

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