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Chinese Import Share and reallocation effect on employment and productivity within the Swedish manufacturing industry

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Abstract

As China has become the top exporter in the world, new trade models move forward in explaining the interactions in world trade. Researchers advocate an increase in productivity and decreased survivability for low productive firms as China enters the market for domestic firms. The purpose of this paper is to research if a higher rate of import from China has a reallocation effect on productivity and employment, from smaller to larger firms for the Swedish manufacturing industry. The study uses panel data ranging from 2000-2015, with an Error-Correction Model approach. Results indicate that high import share from China has little evidence on employment reallocation, however, following previous evidence of redistribution within an industry where smaller firms' productivity decrease and larger firms increase their productivity as Chinese Import Share increase in Sweden.

Keywords: Chinese Import Share, Productivity, Reallocation, Employment, Autoregressive Distributed Lag, Error-Correction Model.

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1. Introduction

From Adam Smith explaining the idea of absolute advantages, Ricardo enhancing a more profound knowledge of comparative advantages and through the Heckscher-Ohlin (H-O) model. These three perspectives have set the cornerstones for international trade. Since then the world has become more global and international, linking people closer together. These models have a hard time to model the implications on the world as we see it now. With the rise of China and changes in the world market, as China ascent to become the top exporter in the world (Atlas, 2018). With other changing factors, such as Donald Trump recent speculations about introducing tariffs between, EU and USA. The topic of international trade has become pivotal for economic research. It affects all of us in society, from ordinary workers to politicians (Burchard, 2018).

As Ricardo and H-O explained inter-industry through comparative advantage, some problems erupt for the models, as they struggled to explain the intra-industry problem. The older models state that trade occurs as an effect of comparative advantage between countries, while the gains from trade between countries are low. As shown by Bernard and Jensen (2001) the H-O model struggles to explain reallocation of resources, firm survivability and overall shifts in the intra-industry market. The reason is that the H-O model focuses on countries and industries, not plants and firms'. Newer models explain the intra-industry paradox; these models try to find the purposes of trade. This emphasis on trade between different countries, to trade between similar countries is where older and newer models diverge. One change is that comparative advantage is subtler, researchers found that the reasons for trade are increasing returns to scale, imperfect competition, economies of scale, network effects, and differentiated goods.

According to Fan et al. (2011), economies of scale is the most notable model used to capture intra-industry trade, which is attributed to Krugman (1979). Where Krugman introduces the idea that consumers prefer to choose from a variety of goods. Melitz (2003) with heterogeneity perspective, captures the productivity levels and shows for higher productivity when trade liberalisation occurs. Krugman's model was to be called New Trade Theory and Melitz model called New New Trade Theory. These two models were to be the first-generation models of intra-industry liberalisation. Krugman emphasises that such integration will be smooth: no firm exits, no decrease in employment, and welfare gains. However, this is not the case as evidence from trade liberalisation shows that it increases unemployment and decrease wages. Melitz provides an opening to make sense of these facts, which was also strengthened by Bernard et al. (2007), that few firms dominate the export market.

Melitz discusses that only a few firms export on the market, meaning only the most productive firms operate in an international open market. This implication leads to firms being forced to exit the market, as competition gets more intensive for firms that are faced by import exposed on the domestic market. The exit of firms creates a reallocation of resources towards the higher productivity firms. Meaning more firms will die out, and a reallocation occurs within the industry, which yields higher average productivity.

Can this reallocation be seen for workers within the firms in the same industry? Meaning, will productive firms grab this workforce. Can we also see that the import of goods increases the value added for the firm as an import from China increase, as this could be part of lower costs for intermediate goods.

Many papers before focused more to see if the change of Chinese importation influence wages and overall household effect, and employment. But not on the idea of the shift of firms, either the focus has been on Chinese Import Penetration and Chinese Import Competition, these two concepts will be further explained in section 2. However, this thesis focuses on if higher Chinese Import Share effects the Swedish manufacturing industry. This to research if Swedish firms are independent of the size of the share or if imports from China are different from the rest of the world.

As a result, the question for this research falls to*: Does Chinese import create a reallocation effect from smaller firms to larger firms of the workforce and productivity within the Swedish manufacturing industry?*

As the newer trade model try to capture the effect of trade liberalisation, and with Melitz perspective. That firm will exit the market and higher average productivity, as well as reallocation, will occur within the industry at firm-level. This thesis will analyse the effect of Chinese import on Swedish firms with a focus on productivity and employment. Is there a reallocation of these two from the smaller firm sizes too the large enterprises? We deal with three group sizes. Small, medium and large firms, where smaller and medium will be analysed together as a group. This as previous literature treats firms either large or small, thus not separating medium firms. Making it interesting to treat small and medium separately and together, to analyse for differences between the two. The size of the firm is however not looked through the profit or turnover, but instead, size is determined by number of employees. This lead to the first one regarding employment, to see if there exists reallocation of demographics between the sizes of the firms. Meaning the number of employees divided by the number of firms in the size pool. The second is the productivity, which is measured by value added per employee. The same process with employees in each firm, to find if the productivity is changed.

This paper consists of an introduction followed by industry dynamics and import competition, where the main theories and models are explained. This is supported by empirical specification where the data, industry, variables and the primary method used is explained. In the following results, the output from the estimation is published and briefly described. What the implications of the findings imply are analysed in the discussion part and connected with previous literature findings and theory. Given this, a conclusion will address the end of the thesis, with an outlook for future research.

2. Industry dynamics and import competition

As stated in the introduction Melitz (2003) starts to introduce the theory that in the world trade market, there is a shift where only the high producing enterprises can survive in this scenario on the world market. Given their ability to sustain the costs implied in a world market, as well as introducing the change from homogenous firms to heterogeneous firms. This theory explained that the most efficient firms reap the benefits from trade. The non-efficient firms face an adverse effect of lost profit and market share. The results of this idea conclude that firms die out and other firms flourish.

The Melitz model has similarities to explain the impacts of international trade. As the Gravity model, which has been used to explain bilateral patterns of international trade before but lacks theoretical foundations. However, Helpman (1987) concluded that trade volume is proportional to the similarity of country size, bilateral trade and inter-group total trade were increasing as the size of countries were similar. Evenett and Keller (2002) found that increasing returns and factor endowments; both played a role in explaining the empirical success of the Gravity equation for a cross-section of developed and developing countries. Therefore the Gravity model has been widely used in empirical work to estimate the impact on trade, policies, transport costs, and tariffs. The same follows for love for variety and economies of scale for Krugman (1979). As Dixit-Stiglitz (1977) introduced these new concepts for international trade. Same follows Corden (1970) for the home-market effect to show preferences for trade patterns as essential, where countries export the goods for which they have a robust domestic market.

Strengthened by Bernard et al. (2007) where they found out that the top exporters in the USA exported 96% of the total export in the USA. Where the firms with the highest productivity are the backbone of the exporters. They also pinpoint that the fixed costs imposed onto these exporters can easily be controlled for by the larger enterprise and not by the smaller enterprises. Helpman et al. (2004) also proved that only the highest productive firms could pay for the high fixed cost of exporting on the world market. Chaney (2008) also demonstrated that larger firms could easily overcome fixed costs, as their productivity is higher than smaller firms and the fixed costs paid are overcome.

Many researchers have analysed this new phenomenon, with implications on countries and why they happen. Melitz and Redding (2014) states the following;

"More broadly, firms are complex organisms, and there remains scope for further research on the boundaries of the firm and the determinants of the products, stages of production and workers that are included within a firm's boundaries. Despite some work on dynamics, much of the literature on firm heterogeneity and trade remains static, and we have relatively little understanding of the processes through which large and successful firms emerge and the implications of these processes for the transitional dynamics of the economy's response to trade liberalization."

This quote gives further ideas about what perspective to analyse the heterogeneity of firms. Also, how trade liberalisation affects the enterprise, scoping for successful and unsuccessful firms. With an interest in the workforce and the complexity of enterprise. As seen with many of the researcher papers regarding the Melitz model and their way to analyse this core questions in different ways. For example, Grossman and Rossi-Hansberg (2008) where they researched about offshoring. They observed that workers lose their job due to offshoring, but productivity increased in domestic enterprises.

Bernard et al. (2003) stated that lower trade barriers tend to nudge out low-productivity plants. While enabling the highly productive to sell more abroad, the number of U.S. plants fall. However, there is little loss of employment. Aggregate productivity rises as employment shifts from low-productivity plants, driven out by import competition to high-productivity plants.

A similar conclusion is observed by Tybout (2000), who discovers that increased foreign competition causes a reallocation of output. Towards the more efficient firms and from import-competing firms. This reallocation of resources may stem from the death of firms in the import-competing industry or their switch to a new industry.

Many researchers before have used different theoretical models to analyse how Chinese import effect countries. One approach is Chinese Import Penetration. Edwards and Jenkins (2015) used this method to analyse the effect in South Africa; this method was also used by Ashournia et al. (2014) for Danish firms. The results show the same, local production decrease and adverse effects on employment and increased average productivity. Wages and employment in labour-intensive industries as textiles and furniture's, where the high-skilled workers were non-affected and a decrease in unemployment for low-skilled workers. Edwards and Jenkins (2015) found a similar result for increasing productivity within industry.

To understand the scope of how China has entered the US market Autor et al. (2012) discussed that the rise of goods US imported from China increased by 1,156 percent from 1991 to 2007. What is important is that it was not the US that made this possible but rather China that made it possible. With rising productivity growth, comparative advantage in labour-intensive sectors, lower trade barriers and trade costs. Many other researchers have also proved this, the case for South Africa and the Danish market also happens in the US. Autor et al. (2012) strengthen the idea that employees within the manufacturing industry decrease and wages declined as an import from China increase. The starting point where Chinese import observations start around 2000's, where China begins to enter the market intensively. Amiti and Freund (2010) showed that China had an expectational export growth of 500 percent, from 1994 and 15 years forward. Under this period China took over Japan on world exporter market and became the third biggest exporter in the world. As for now, China is placed as the number one exporter in the world (Atlas, 2018). Under this period, classic Chinese exports, such as textile and agriculture, changed to electronics and machinery. New variants did not conduct the growth, but instead, existing products led it. The difference between the rest of the export to the USA is that China average prices for exported goods fell with 1.6 percent per year from 1997 to 2005. In comparison to other countries, the number was 0.4 percent over the same period.

Bernard et al. (2006) emphasise that industry survival and employment growth are negatively associated with the share of imports from the world lowest-wage countries. This points out that increased exposure to low-wage countries has enhanced the progress of the industry to be capital deepening, both across and within manufacturing industries. Where China is an example of a low-wage country.

The same western countries ruled the world trade over many decades, however as Chinese export increased, domestic firms have become more exposed to competition. Bloom et al. (2015) discussed that as Chinese Import Competition increased, it influenced reallocation of employees where workers moved from less technology firms to more advanced firms. This fits Melitz's model, where survivability for established firms decreased, and employment growth for low-tech firms declined. This was also the case for Bernard et al. (2010) where they observed a reallocation of resources in the tech industry. However, Mion and Zhu (2013) also noted this; they discussed that firm survivability was not affected by Chinese Import Competition. Which is different from many other researchers addressed previously, stating that that Chinese Import decreases firm survivability.

As proven before Chinese import effects different type of countries in the same manner. Iacovone (2013) explored Chinese Competition in Mexico; the same pattern arises, forcing reallocation at firm-level within the same industry, impacts profoundly on the intensive and extensive margins. Small firms' survivability decreases but core products are indifferent. Intermediate products have positive effects on the more prominent firms as it becomes cheaper as Chinese competition increases, where average productivity increases. Combined with China's comparative advantages in low labour costs, and as mentioned before the reduced cost of trade.

Looking through the previous literature, there is little research conducted on Sweden. Making it an interesting country to research on, as to see if Sweden behaves differently from the other countries researched on before.

These theories create the question in this thesis, the ability to observe reallocation within the industries, which are part of this papers focus. Where these reallocation effect regarding productivity and employment can be seen among the more prominent firms within the Swedish manufacturing industry.

3. Empirical Specification

This section will introduce the data and setup for the variables required for the estimation, for this thesis.

3.1 Industry definition and setup

To be able to analyse the effect of Chinese import effect on Swedish firms, reallocation effect on employment and productivity are considered. It is needed to collect data that fit the represent firm's size level; this data has been obtained from Statistics Sweden (*SCB*), from the years 2000-2015 as yearly data. The year 2000 has been chosen according to section 2, as this year is when China is intensively entering the world trade market. As SCB has different forms in categorising the various industries in manufacturing, with different NACE (*SNI)* codes, wherein this thesis focus on NACE Rev.1.1 (*SNI2002*) and NACE Rev.2 (*SNI2007)*. The reason why of using both, is that SNI2002 range from the year 2000-2007 and SNI2007 from the year 2008-2015. This change has a significant part in this thesis as subcategories are not the same in SNI2007 and SNI2002.

The SNI codes have different ranks, which goes from 2-5. 2 is the code used in this paper, which implies that SNI2002 have 13 different clusters, and SNI2007 have 14 different clusters to work with. Table A1 an A2 found in the appendix describes these clusters in more detail. Important to know is that some clusters have the same name over the SNI codes. However, this is not the case since when breaking down the chain, SCB has changed what counts in each cluster. Meaning, the SNI2002, and SNI2007 are not perfect correlated over time what has computed within the cluster. Also, SNI2007 exhibit missing values. For the industry 15 for medium and large enterprises between years 2013-2015. There is also missing values for Industry 18 for medium and large enterprises year 2014; a linear interpolation substitutes these missing values.

As same clusters of industry are not included in the code overlap between SNI2002 and SNI2007. Creates an opportunity for separated two-panel datasets and also a Combined set of SNI2002 and SNI2007. There are 13 industry clusters in SNI2002 and 14 in SNI2007, and to integrate them, it is required to combine 26 and 27 codes in SNI2007 to match code 13 for SNI2002 in this thesis.

There are 5 different sizes, which are reported by SCB 0-19, 20-49, 50-99, 100-249 and 250+, regarding OECD (2018), 0-10 is microenterprise, 10-49 is small. This thesis will combine these two into a mix of small to micro enterprises, and 50-249 as medium-sized firms and 250+ are considered to be large enterprises.

The choice of panel data is not a surprise, as we are analysing a variable across entities, which is size and industry in this case. Standard models cannot apprehend that, as we want to account for individual's heterogeneity. Panel data is such an advocate of both time series and cross-sectional data.

To create a model that follows statically code requires different diagnostics and assumptions. As expected of the data and from looking at the variables, this thesis suspect of heteroskedastic and autocorrelation. Thus, implies that robust standard errors are being used to offset this problem. The two dependent variables will be logged, to avoid large numbers.

The Fixed Effect panel data is intuitive as the model with Fixed Effect explores the relationship within an entity, and the time-invariant characters are unique to the respective entity. As for the given result, the question to study the change within the different entity. A use of Time-Fixed Effect dummy is also implemented to capture trend and also to offset shocks in the Combined set. When SCB switched from SNI2002 to SNI2007, between the year 2007 and 2008.

3.2 Specification

As mentioned before, the main reason for this paper is to see the Chinese Import Share (CIS) effect on Swedish firms and to build a model within this structure. The two dependent variables will be looked at in two ways. The changes in number of employees in enterprises, given size changes as CIS varies. Also, if the value added over the number of employees' changes for given size changes. Below is a table that explains the different variables used, abbreviations and description.

Table 1: Description

Variables	Abbreviation	Description
Employees/Enterprise	EF	Employees divided by enterprises, given size and industry cluster. Measures if there is a change of number of employees in the category firm size.
Value Added/Employees	VAE	Value Added divided by number of employees, given size and industry cluster. As a measurement of productivity.
Chinese Import Share	CIS	The share of total import to Sweden from China within an industry cluster.

3.2.1 Independent Variable

The independent variable to look for as given by the thesis is CIS_i, this is the share of total Swedish import that comes from China given different industry cluster.

$$CIS_i = \frac{CI_i}{TI_i} \tag{1}$$

Where CI is the Chinese Import and TI is the Total Import, i is industry cluster. To analyze the change of CIS given size, an implement of CIS on size will be conducted, through creating a variable that only looks for import at different firm sizes. Three firm sizes will be looked at separately, these are presented below.

To find if smaller enterprises suffer from exposure to CIS, a variable for firms belonging to the size small is created.

$$CIS_{se,i} \tag{2}$$

Where se implies Small Enterprises, and i stands for the industry cluster. An analysis will also be conducted for medium firms.

$$CIS_{me,i} \tag{3}$$

Where me implies Medium Enterprises, and i stands for the industry cluster. The last analysis will be conducted for large firms.

$$CIS_{le,i} \tag{4}$$

Where le implies Large Enterprises, and i stands for industry cluster.

3.2.2 Dependent Variables

The dependent variables in this thesis, are built on the question at hand. As to find out if the number of employee's changes over the number of firms, in a given industry cluster for a given size:

$$EF_{s,i} = \frac{\#E_{s,i}}{\#F_{s,i}} \tag{5}$$

Where i is the industry cluster and s are the firm sizes, # stands for the number. Thus, $\#E_{s,i}$ is the number of employees in the industry cluster i and the size s, $\#F_{s,i}$ is the number of firms within the industry cluster i and s is the size in that industry cluster. $EF_{s,i}$ can be interpreted as the mean employees for the firms within the industry cluster given the size.

To explain for productivity Bernard et al. (2003) used value added divided by the number of employees. Therefore this thesis will use the same variable as a sign of productivity for firms.

$$VAE_{s,i} = \frac{VA_{s,i}}{\#E_{s,i}} \tag{6}$$

Where i is the industry cluster and s are the firm sizes, # stands for the number. Thus, $VA_{s,i}$ is the value added in the industry cluster i and that size s, as before $\#E_{s,i}$ is the number of employees within the industry cluster i and s is the size. $VAE_{s,i}$ can be interpered as the mean value added per employee within the industry cluster given the size.

3.2.3 Modeling

As described previously, when the independent and dependent variables are put together, they allow us to generate the first regression and its sub regression. The first regression is as follow.

$$EF_{s,i} = \alpha_{s,i} + CIS_i + \varepsilon_{s,i} \tag{7}$$

$$VAE_{s,i} = \alpha_{s,i} + CIS_i + \varepsilon_{s,i} \tag{8}$$

When considering these regression, they give a result for the overall effect, and not the impact in the case of the enterprise being small or bigger than small. To analyse this, two extensions have been created from the primary model with $CIS_{se,i}$, $CIS_{me,i}$ and $CIS_{le,i}$, they are treated as dummy variables an take a value of 0 or 1. For example, if import is of interest for smaller firms $CIS_{se,i}$ take a value of 1, and 0 for medium and large firms. This follows for the other extensions as well. From this point, we create three models:

$$y_{s,i} = \alpha_{s,i} + CIS_i + \varepsilon_{s,i} \tag{9}$$

$$y_{s,i} = \alpha_{s,i} + CIS_i + CIS_{se,i} + CIS_{me,i} + \varepsilon_{s,i} \tag{10}$$

$$y_{s,i} = \alpha_{s,i} + CIS_i + CIS_{le,i} + \varepsilon_{s,i} \tag{11}$$

Where $y_{s,i}$ is either of the two dependent variable EF or VAE, where i is industry cluster and size is s. These; three types of equations create three kinds of models. Equation 9 is the Model 1 which is to research the general CIS effect (same as equation 7 and 8). Equation 10 is the Model 2 which purpose is to see if smaller and medium firms behave differently from the general CIS. At last, equation 10 is the Model 3, is to research if larger firms behave differently than the general CIS.

3.3 From Unit-root to ARDL in Panel Data

Given aspect of the time-series data, it requires for stationarity in the data set. This is provided by dividing SNI2002 and SNI2007 separately, and when Combined gives a robust balance data. The standard unit-root test for time-series does not apply for panel data. To test for unit-root in panel data, the Im–Pesaran–Shin (IPS) unit-root analysis is used. It assumes that all panels have the same value of rho, it also allows for not all the panels possessing unit roots. The unit-root will be tested with and without trend, to test for inconsistency. (Im, Pesaran and Shin, 2003)

In the case of the independent variable being non-stationary, and if the two dependent variables are also non-stationary. We are faced with a problem of spurious regression, that yields an incorrect estimation of the results. However, when two non-stationary variables become a linear combination that is stationary, is a so-called cointegration. Cointegration is only possible when the variables have the same order of integration. This is controlled through a residual-based test for cointegration also known as an Engle-Granger two-step method (Engle and Granger, 1987). This system test for unit-root within the residuals for the regression. However, this test does not work for panel data. Instead, Pedroni (1999) developed a cointegration test for panel data. Which is based on the Engle and Granger residual-based cointegration. Pedroni offered heterogeneous intercepts and trend cointegration test and calculated eleven statistics with different degrees of properties. EViews provides the cointegration test pre-installed, as and Stata does not. This will lead to a test for unit-root as well in EViews for IPS, this to see if there is inconsistency in the programs and if they give the same result.

The issues discussed above leads to test for Error-Correction Model (ECM), as an ordinary OLS regression will be spurious with non-stationary data. In this thesis an Autoregressive Distribution Lag (ARDL) with (1 1) lag is used, ARDL is an ECM based model. It can handle a combination of integration, as an order of integration of I(0) and I(1). If the unit-root results are integrated of order I(0) to I(1), within Eviews and Stata output, leads to estimating the model with ARDL. If the integration is I(2) for any variable the ARDL breaks down, and in that case, no estimation is done for that variable. (Nkoro and Uko, 2016)

The ARDL also calculate the short-run and long-run, where the short-run exhibit an Error-Correction (EC) value, the EC is known as the speed of adjustment. Thus, how much the model corrected itself from the previous period to reach the new period. (Lebo and Kraft, 2017)

Therefore, if the unit-root shows evidence for I(1) combination, and not I(0) which are stationary at the level, an ARDL based ECM will be conducted. If the integration order shows for I(0) for both variables, a Fixed Effect model will be conducted. This opportunity creates a sensitivity analysis of the data later discussed in the paper.

4. Results

This section will talk about the results from cointegration and unit-root test; it will be followed by the results for the given ARDL model and the Fixed Effect for the Combined set (which is explained in section 3), for separated employment and productivity measurement.

4.1 Unit-root and cointegration test

Table A3 to A5 in the appendix shows the results of the unit-root test; the results show without trend and with the trend. There is some inconsistency between the EViews and Stata output for stationarity. The results are indicating that ARDL estimation is of interested in both SNI2002, SNI2007, and Combined, and a Fixed Effect model for the Combined set.

As ARDL based ECM can estimate when two variables are cointegrated when both variables are I(1) and a cointegration exists between the variables with a value of I(0), and also for a mix between I(1) and I(0). Looking in the appendix at table A6 to A8 the results indicated an ARDL based ECM test estimation can be used. Therefore, the results from the estimates to follow are constructed from the unit-root and cointegration results.

4.2 Employment

Table 2 below is for the ARDL estimation for the SNI2002 set and Employment; it is based on the Table A9 in the appendix.

Table 2: ARDL for SNI2002 and Employment

Variables	(SR) Model 1	(SR) Model 2	(SR) Model 3	Variables	(LR) Model 1	(LR) Model 2	(LR) Model 3
Δ CIS	0.381	-0.422	0.607	CIS	-0.360	0.490	-0.532
	(0.679)	(2.860)	(0.449)		(0.500)	(0.899)	(0.491)
Δ CIS_{SE}	-	0.880	-	CIS_{SE}	-	-1.201	-
	-	(2.916)	-		-	(1.099)	-
Δ CIS_{ME}	-	1.176	-	CIS_{ME}	-	-0.835	-
	-	(2.995)	-		-	(1.043)	-
Δ CIS_{LE}	-	-	-1.055	CIS_{LE}	-	-	0.993
	-	-	(2.937)		-	-	(0.977)
EC	-0.568***	-0.584***	-0.584***				
	(0.0506)	(0.0557)	(0.0557)				
Constant	2.264***	2.326***	2.311***				
	(0.197)	(0.220)	(0.227)				

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run.

Results indicate that there is no significance for the independent variable, in the short-run or long-run. The EC shows significance for the speed of adjustment, with a 56.8% for Model 1 and 58.4% for Model 2 and 58.4% for Model 3 respectively. Each model is corrected in the previous period to the current period with their EC value.

Table 3 below is for the ARDL estimation for the SNI2007 set and Employment; it is based on the Table A10 in the appendix.

Table 3: ARDL for SNI2007 and Employment

Variables	(SR) Model 1	(SR) Model 2	(SR) Model 3	Variables	(LR) Model 1	(LR) Model 2	(LR) Model 3
Δ CIS	1.040*	1.299	0.975*	CIS	-3.510	-5.638	-3.028
	(0.589)	(1.978)	(0.549)		(3.594)	(4.779)	(3.766)
Δ CIS_{SE}	-	-0.752	-	CIS_{SE}	-	3.761	-
	-	(2.019)	-		-	(4.663)	-
Δ CIS_{ME}	-	0.963	-	CIS_{ME}	-	-0.523	-
	-	(2.555)	-		-	(6.185)	-
Δ CIS_{LE}	-	-	0.322	CIS_{LE}	-	-	-2.782
	-	-	(2.055)		-	-	(4.342)
EC	-0.383*	-0.385*	-0.377*				
	(0.222)	(0.209)	(0.220)				
Constant	1.598*	1.606**	1.574*				
	(0.835)	(0.788)	(0.826)				

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run.

There is significance for Δ CIS in the short-run, with a positive parameter. Suggesting that change in CIS has a positive effect on Employment in Model 1 with a value of 1.04 and Model 3 with a value of 0.975. The EC shows significance for the speed of adjustment, with a 38.3% for Model 1 and 38.5% for Model 2 and 37.7% for Model 3 respectively. Each model is corrected in the previous period to the current period with their EC value.

Table 4 below is for the ARDL estimation for the Combined set and Employment; it is based on the Table A11 in the appendix.

Table 4: ARDL for Combined and Employment

Variables	(SR) Model 1	(SR) Model 2	(SR) Model 3	Variables	(LR) Model 1	(LR) Model 2	(LR) Model 3
Δ CIS	1.374	6.430	0.130	CIS	-2.343*	-5.848	-1.373
	(1.462)	(4.953)	(0.533)		(1.358)	(4.625)	(0.923)
Δ CIS_{SE}	-	-7.119	-	CIS_{SE}	-	4.812	-
	-	(4.932)	-		-	(4.537)	-
Δ CIS_{ME}	-	-5.484	-	CIS_{ME}	-	4.132	-
	-	(4.898)	-		-	(4.676)	-
Δ CIS_{LE}	-	-	6.306	CIS_{LE}	-	-	-4.455
	-	-	(4.889)		-	-	(4.558)
EC	-0.248***	-0.259***	-0.260***				
	(0.0142)	(0.0234)	(0.0226)				
Constant	1.001***	1.042***	1.046***				
	(0.0533)	(0.103)	(0.0994)				

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run.

There is significance for CIS in the long-run, with a negative parameter of -2.343. Suggesting that CIS has a general adverse effect on Employment in Model 1. The EC shows significance for the speed of adjustment, with a 24.8% for Model 1 and 24.8% for Model 2 and 26% for Model 3 respectively. Each model is corrected in the previous period to the current period with their EC value.

Table 5 below is for the Fixed Effect estimation for the Combined set and Employment; it is based on the Table A12 in the appendix.

Table 5: Fixed Effect for Combined and Employment

Variables	Model 1	Model 2	Model 3
CIS	-0.781	-1.018	-0.722
	(0.499)	(1.666)	(0.533)
CIS_{SE}		0.0861	
		(1.874)	
CIS_{ME}		0.505	
		(1.830)	
CIS_{LE}			-0.295
			(1.810)
Constant	4.027***	4.027***	4.027***
	(0.0168)	(0.0171)	(0.0172)
R^2	0.045	0.046	0.045

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises.

The Fixed Effect model for the Combined panel set, shows no significance for none of the variables. Also, with a low R^2 value of 0.045 for Model 1, 0.046 for Model 2 and 0.045 for Model 3.

4.3 Productivity

Table 6 below is for the ARDL estimation for the SNI2002 set and Productivity; it is based on the Table A13 in the appendix.

Table 6: ARDL for SNI2002 and Productivity

Variables	(SR) Model 1	(SR) Model 2	(SR) Model 3	Variables	(LR) Model 1	(LR) Model 2	(LR) Model 3
Δ CIS	-0.136	2.128	-0.672	CIS	0.715	1.286	0.569
	(1.626)	(6.090)	(1.031)		(0.589)	(2.321)	(0.618)
Δ CIS_{SE}	-	-3.314	-	CIS_{SE}	-	-0.406	-
	-	(5.967)	-		-	(2.490)	-
Δ CIS_{ME}	-	-2.287	-	CIS_{ME}	-	-1.028	-
	-	(6.156)	-		-	(2.485)	-
Δ CIS_{LE}	-	-	2.796	CIS_{LE}	-	-	0.716
	-	-	(5.983)		-	-	(2.468)
EC	-0.522***	-0.537***	-0.537***				
	(0.124)	(0.131)	(0.130)				
Constant	-0.663***	-0.683***	-0.682***				
	(0.163)	(0.171)	(0.169)				

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run.

The results of the independent variable show no significance in either of the three models, in short-run and long-run. The EC shows significance for the speed of adjustment, with a 52.2% for Model 1 and 53.7% for Model 2 and 53.7% for Model 3 respectively. Each model is corrected in the previous period to the current period with their EC value.

Table 7 below is for the ARDL estimation for the SNI2007 set and Productivity; it is based on the Table A14 in the appendix.

Table 7: ARDL for SNI2007 and Productivity

Variables	(SR) Model 1	(SR) Model 2	(SR) Model 3	Variables	(LR) Model 1	(LR) Model 2	(LR) Model 3
Δ CIS	-1.527	-2.170	-1.373	CIS	-1.355	1.476	-2.059
	(1.027)	(3.113)	(0.881)		(1.688)	(4.427)	(1.575)
Δ CIS_{SE}	-	1.014	-	CIS_{SE}	-	-4.133	-
	-	(3.125)	-		-	(4.385)	-
Δ CIS_{ME}	-	0.174	-	CIS_{ME}	-	-1.754	-
	-	(3.291)	-		-	(4.446)	-
Δ CIS_{LE}	-	-	-0.805	CIS_{LE}	-	-	3.556
	-	-	(3.094)		-	-	(4.342)
EC	-0.790***	-0.790***	-0.787***				
	(0.0772)	(0.0774)	(0.0768)				
Constant	-0.0758	-0.0758	-0.0757				
	(0.101)	(0.100)	(0.102)				

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run.

The results show no significance for independent in either of the three models, in the short-run and long-run. The EC shows significance for the speed of adjustment, with a 79% for Model 1 and 79% for Model 2 and 78.7% for Model 3 respectively. Each model is corrected in the previous period to the current period with their EC value.

Table 8 below is for the ARDL estimation for the Combined set and Productivity; it is based on the Table A15 in the appendix.

Table 8: ARDL for Combined and Productivity

Variables	(SR) Model 1	(SR) Model 2	(SR) Model 3	Variables	(LR) Model 1	(LR) Model 2	(LR) Model 3
Δ CIS	0.345	-2.334	1.050	CIS	-2.309**	1.638	-3.272***
	(0.742)	(1.619)	(0.723)		(1.021)	(2.162)	(1.095)
Δ CIS_{SE}	-	4.264**	-	CIS_{SE}	-	-6.483***	-
	-	(1.763)	-		-	(2.204)	-
Δ CIS_{ME}	-	2.525	-	CIS_{ME}	-	-3.322	-
	-	(1.744)	-		-	(2.072)	-
Δ CIS_{LE}	-	-	-3.395**	CIS_{LE}	-	-	4.905**
	-	-	(1.641)		-	-	(2.106)
EC	-0.287***	-0.309***	-0.303***				
	(0.0330)	(0.0338)	(0.0323)				
Constant	0.0166	0.0134	0.0143				
	(0.0277)	(0.0295)	(0.0302)				

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run.

The results show significance in short-run Model 2 for Δ CIS_{SE} with a value of 4.264 and Model 3 for Δ CIS_{LE} with an amount of -3.395. For the long-run Model 1 CIS with a value of -2.309, Model 2 for CIS_{SE} with a value of -6.483. Lastly Model 3 exhibit significance for all the variables in interest with a value of -3.272 for CIS and with a value of 4.905 for CIS_{LE}. Interesting is that the results from short-run and long-run are opposite of each other, later analysed in the discussion. The EC shows significance for the speed of adjustment, with a 28.7% for Model 1 and 30.9% for Model 2 and 30.3% for Model 3 respectively. Each model is corrected in the previous period to the current period with their EC value.

Table 9 below is for the Fixed Effect estimation for the Combined set and Productivity; it is based on the Table A16 in the appendix.

Table 9: Fixed Effect for Combined and Productivity

Variables	Model 1	Model 2	Model 3
CIS	-2.013**	1.621	-2.922***
	(0.772)	(2.331)	(0.795)
CIS_{SE}		-5.497**	
		(2.312)	
CIS_{ME}		-3.589	
		(2.262)	
CIS_{LE}			4.543**
			(2.271)
Constant	-1.135***	-1.135***	-1.135***
	(0.0215)	(0.0237)	(0.0232)
R^2	0.860	0.870	0.868

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises.

The Combined Fixed Effect model shows that significance exists in Model 1 for CIS with a value of -2.013, Model 2 for the CIS_{SE} with an amount of -5.497. Lastly, Model 3 has significance for CIS with an amount of -2.922 and CIS_{LE} with a value of 4.543. The R^2 shows a high value in each of the models of 0.86 for Model 1, 0.87 for Model 2 and 0.868 for Model 3.

5. Discussion

From this point onwards, we will discuss the results from the previous section, in three main parts Employment, Productivity, and Sensitivity of data.

5.1 Employment

In reference to the results given for the employment in enterprises, the primary results, for all given methods and the three panels shows little proof or either no significance for that when Chinese Import Share increases, it affects the employment. Regarding this evidence, and Melitz (2003) includes in his model that firms will exit the market, and a reallocation effect will happen to the more productive firms. Thus, this thesis cannot find substantial evidence, which changes in Chinese Import Share create a reallocation effect for employment. Other researchers such as Edwards and Jenkins (2015), Ashornia et al (2014), Autor et al. (2012) and Bernard et al (2003, 2006), Iacovone (2013) and Bloom et al. (2015) found that import effect from China has an adverse impact on employment and a reallocation effect occurs. The results are more coherent with Mion and Zhu (2013), where little evidence and overall no reliable proof that Chinese Import affects or create reallocation of employment.

SNI2007 shows evidence for the short-run in general. Where an increase in CIS increases the employment overall in the industry, for Model 1 and Model 3. With a lower value when import on the larger firm is treated separately.

The Combined model, on the other hand, shows no sign in the short run but shows a negative parameter in the long-run on the general CIS for Model 1. Wherein SNI2007 CIS had a positive effect in the short-run for Model 1 and Model 3. Combining the results over all the panel sets it is evidence for little proof that Chinese Import Share has any effect on employment. The two results above explained, are between the 5% and 10% significance. An interesting thing to notice is that the short-run is opposite of long-run, this is an exciting finding, which will be more discussed in the section for productivity. The long-run result is a sign for some of the literature that employment decreases in industry, however, as stated in section 4 no proof for smaller or larger firms are observed.

The Combined Fixed Effect model shows an R^2 of lower than 5%. Interpretation of this is as EF change; it is not explained by the model in much detail. This strengthens the non-significant value interpretation. This way of researching the reallocation effect for employment could be the wrong way. As mentioned before, the previous researcher found evidence using a different type of setup as Chinese Import Penetration.

5.2 Productivity

The results of productivity show another result regarding employment and the Chinese Import Share. There is substantial evidence in both the ARDL case and the Fixed Effect model for the Combined set, but no proof in the separate SNI2002 and SNI2007 models. The results from the short-run Combined ARDL model shows no evidence of the general Chinese Import Share, or for the medium firms. But instead for the small and larger firms, with a positive effect on the smaller and a detrimental impact on the larger firms. Surprisingly different parameters between the long-run and the short-run. Where Chinese Import Share has a general adverse impact in the long run on the productivity. However, the evidence found shows that there is a more significant adverse effect on smaller firm separated from the general. Chinese Import Share has a positive impact on the larger firms in the long run. The Fixed Effect model shows the same result that the general impression is adverse, the smaller firm has an adverse effect, and the larger firm has a positive impact. It also achieves a high R^2 value of around 86% across the models. That is, the model has a high explanation of the changes to productivity.

As discussed and seen in Employment, the short-run and long-run are different parameters, as either productivity increase by the lower number of employees or higher value-added. This is taken into account in section 6.

Comparing the long-run from ARDL and output from the Fixed Effect indicates that in fact as previous researchers explained. The increase in Chinese Import contributes for the rise in the productivity for larger firms and decrease productivity for the smaller firms. With smaller firms survivability as one of the reasons and also the lower price of intermediate goods from China. These results are in line with Melitz (2003), and other findings from the researcher as Ashournia et al. (2014), Edwards and Jenkins (2015), Bernard et al. (2003), Tybout (2000) and Iacovne (2013). The results are stating higher productivity for larger firm, as in in the long-run benefit more from Chinese Import Share. The Chinese Import Share hurts smaller firms, and the general impact is negative.

5.3 Sensitivity

The unit-root shows different results regarding the program of choice. The unit-root shows different outcome, if the variables are affected by a trend or not. The mixed results indicated that the use of different models, as previously stated when both variables are I(0) than a regular Fixed Effect model can be used. With I(1) for the variables and I(0) cointegration, and a mix of I(1) and I(0), the ARDL based ECM is used. There is one proof of digression for CIS in SNI2007 with trend and EViews of I(2), neither ARDL or Fixed Effect cannot handle this problem.

The ARDL model and Fixed Effect model, are not different in their results. As seen clearly in Productivity with the Combined set, the Fixed Effect model is close in line with the long-run in the ARDL, where it indicates the same sign parameters. However, there is a difference in the value, in the Model 1 CIS case difference is of 14.7%, CIS_{SE} in Model 2 of 17.9% and for Model 3 CIS of 11.9% and CIS_{LE} of 7.9%.

For the different sets, EC is also different, as EC is the measurement of the speed of adjustment. It shows how much of correction the model will have from the previous period going into the next period. SNI2002 experience a value that is around 60% for employment for the three models, SNI2007 with approximately 40%. The Combined have an overall low speed of adjustment of 25%. Implying that SNI2002 long-run correction in the previous period is high, where less correction for SNI2007 happens in the previous period and lesser for the Combined set. For productivity, SNI2002 stays close to 50%, with a medium correction. In this situation, SNI2007 have a high value of correction of around 80%. The Combined has a low amount of about 30% correction in productivity. The results imply that when splitting the model, the models have a higher correction. Thus SNI2002 and SNI2007 have a lower memory than the Combined set.

Therefore, splitting the model into SNI2002 and SNI2007 shows little and overall no significance for the variables, this could be a problem of few observations per panel. However, results from the Combined show little evidence for the employment, and significance for productivity. Where the results from productivity discussed before was in line with the literature. Splitting the data is not recommended as this result shown in both unit-root, ARDL and Fixed Effect that the data is overall sensitive to the trend.

6. Conclusion

This thesis found similar evidence as in the previous literature that as Chinese Import increase productivity a reallocation of productivity from smaller firms to larger firms occurs. However, regarding employment, there is little evidence for such thing. Instead, the models overall fail to explain changes in employment. These findings suggest that policymakers should not focus on employment, but instead on productivity and niche their policies differently for larger and smaller firms when opening up for trade.

Regarding productivity, the ARDL based ECM and Fixed Effect model with the Combined set show similar results for what the Melitz (2003) and other researchers explored, that Chinese import increase productivity. This was the case for the Swedish manufacturing industry, and where the smaller firm decreases their productivity and larger firm increase theirs. However, this was not observed with the SNI2002 and SNI2007 sets. Regarding employment, the results show no change as Chinese Import Share increases, in either of the panel sets and method.

Splitting the data creates sensitivity problems with a combination of unit-root and evidence for a more considerable speed of adjustment. Using a Combined set is the solution, this requires putting two industries from SNI2007 into one cluster, so it matches the SNI2002 clustering

An exciting finding shows that the short-run effects are opposite of the long-run effects. This incentive that future researchers focus on separating long-run and short-run, and also research the impact on firms in the short-run. Hence it would be interesting to investigate the micro-level within the firm clusters with size-specific data, and more independent variables that have size depending properties.

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8. Appendix

Table A1: Manufacturing clusters for SNI2002

Thesis Code	SNI2002 Code	Description
1	15-16	Food, Beverage, and Tobacco
2	17-19	Textile, Clothing, and Tanneries
3	20	Wood and products of Wood
4	21	Pulp, Paper, and Paper products
5	22	Publishers and Printers; other industry for recorded Media
6	23-24	Coke, Refined Petroleum, Nuclear Fuel, and Chemicals
7	25	Rubber and Plastic products
8	26	Other Non-Metallic Mineral products
9	27-28	Basic Metals and Fabricated Metal Products
10	29	Machinery and Equipment
11	30-33	Electrical Machinery, Apparatus, and Optical instruments
12	34-35	Transport Equipment
13	36-37	Furniture and other Manufacturing industry

Note: The codes, and further interpretation of what industries belong to which cluster can be found at SCB.

Table A2: Manufacturing clusters for SNI2007

Thesis Code	SNI2007 Code	Description
14	10-12	Food, Beverage, and Tobacco
15	13-15	Textile, Clothing, and Leather
16	16	Wood and products of Wood
17	17	Paper and products of Paper
18	18	Printers and products of Media
19	19-21	Petroleum, Chemical and Pharmaceutical
20	22	Rubber and Plastic products
21	23	Other Non-Metallic mineral products
22	24-25	Basic Metal and Fabricated Metal Products
23	26-27	Computer, Electronics, Optical products and Electrical Equipment
24	28	Machinery and Equipment
25	29-30	Transport Equipment
26	31	Furniture
27	32	Other Manufacturing industry

Note: The codes, and further interpretation of what industries belong to which cluster can be found at SCB.

Table A3: Unit-root test for SNI2002

Model	Variables	IPS/EViews	IPS/Stata
With Trend	ln EF	I (1)**	I (1)***
	ln VAE	I (1)*	I (1)***
	CIS	I (1)**	I (1)***
Without Trend	ln EF	I (0)**	I (0)***
	ln VAE	I (1)***	I (0)*
	CIS	I (1)***	I (1)***

Note: *** p<0.01, ** p<0.05, * p<0.1. I(*d*) stands for the integration order.

Table A4: Unit-root test for SNI2007

Model	Variables	IPS/EViews	IPS/Stata
With Trend	ln EF	I (1)**	I (0)***
	ln VAE	I (0)**	I (0)***
	CIS	I (2)***	I (1)***
Without Trend	ln EF	I (1)***	I (0)*
	ln VAE	I (1)***	I (1)***
	CIS	I (1)***	I (1)***

Note: *** p<0.01, ** p<0.05, * p<0.1. I(*d*) stands for the integration order.

Table A5: Unit-root test for Combined

Model	Variables	IPS/EViews	IPS/Stata
With Trend	ln EF	I (0)***	I (0)***
	ln VAE	I (0)*	I (0)*
	CIS	I (0)**	I (0)*
Without Trend	ln EF	I (0)***	I (0)***
	ln VAE	I (1)***	I (1)***
	CIS	I (1)***	I (1)***

Note: *** p<0.01, ** p<0.05, * p<0.1. I(*d*) stands for the integration order.

Table A6: Cointegration test for SNI2002

Model	Combination	Pedroni
With Trend	ln EF – CIS	I (0)***
	ln VAE – CIS	I (0)***
Without Trend	ln EF – CIS	I (0)***
	ln VAE – CIS	I (0)***

Note: *** p<0.01, ** p<0.05, * p<0.1. I(*d*) stands for the integration order.

Table A7: Cointegration test for SNI2007

Model	Combination	Pedroni
With Trend	ln EF – CIS	I (0)***
	ln VAE – CIS	I (0)***
Without Trend	ln EF – CIS	I (0)***
	ln VAE – CIS	I (0)***

Note: *** p<0.01, ** p<0.05, * p<0.1. I(*d*) stands for the integration order.

Table A8: Cointegration test for Combined

Model	Combination	Pedroni
With Trend	ln EF – CIS	I (0)***
	ln VAE – CIS	I (0)**
Without Trend	ln EF – CIS	I (0)***
	ln VAE – CIS	I (0)**

Note: *** p<0.01, ** p<0.05, * p<0.1. I(*d*) stands for the integration order.

Table A9: ARDL for SNI2002 and Employment

Variables	(LR) Model 1	(SR) Model 1	(LR) Model 2	(SR) Model 2	(LR) Model 3	(SR) Model 3
EC		-0.568***		-0.584***		-0.584***
		(0.0506)		(0.0557)		(0.0557)
CIS	-0.360		0.490		-0.532	
	(0.500)		(0.899)		(0.491)	
CIS_{SE}			-1.201			
			(1.099)			
CIS_{ME}			-0.835			
			(1.043)			
CIS_{LE}					0.993	
					(0.977)	
Δ CIS		0.381		-0.422		0.607
		(0.679)		(2.860)		(0.449)
Δ CIS_{SE}				0.880		
				(2.916)		
Δ CIS_{ME}				1.176		
				(2.995)		
Δ CIS_{LE}						-1.055
						(2.937)
t2	0.0203	0.0115	0.0208	0.0122	0.0207	0.0120
	(0.0262)	(0.0142)	(0.0264)	(0.0148)	(0.0266)	(0.0148)
t3	0.0470	0.0267	0.0467	0.0273	0.0468	0.0271
	(0.0321)	(0.0198)	(0.0308)	(0.0192)	(0.0309)	(0.0192)
t4	8.69e-05	4.94e-05	0.00108	0.000632	0.000844	0.000490
	(0.0211)	(0.0120)	(0.0198)	(0.0116)	(0.0199)	(0.0116)
t5	0.0204	0.0116	0.0201	0.0118	0.0202	0.0117
	(0.0161)	(0.00954)	(0.0156)	(0.00933)	(0.0158)	(0.00939)
t6	0.0129	0.00735	0.0126	0.00735	0.0127	0.00735
	(0.0138)	(0.00802)	(0.0134)	(0.00791)	(0.0134)	(0.00786)
t7	0.0373***	0.0212***	0.0361***	0.0211***	0.0364***	0.0211***
	(0.0133)	(0.00822)	(0.0131)	(0.00809)	(0.0131)	(0.00810)
Constant		2.264***		2.326***		2.311***
		(0.197)		(0.220)		(0.227)

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run. If t is missing, it depends that the value is omitted.

Table A10: ARDL for SNI2007 and Employment

Variables	(LR) Model 1	(SR) Model 1	(LR) Model 2	(SR) Model 2	(LR) Model 3	(SR) Model 3
EC		-0.383*		-0.385*		-0.377*
		(0.222)		(0.209)		(0.220)
CIS	-3.510		-5.638		-3.028	
	(3.594)		(4.779)		(3.766)	
CIS_{SE}			3.761			
			(4.663)			
CIS_{ME}			-0.523			
			(6.185)			
CIS_{LE}					-2.782	
					(4.342)	
Δ CIS		1.040*		1.299		0.975*
		(0.589)		(1.978)		(0.549)
Δ CIS_{SE}				-0.752		
				(2.019)		
Δ CIS_{ME}				0.963		
				(2.555)		
Δ CIS_{LE}						0.322
						(2.055)
t2	0.00704	0.00270	0.00727	0.00280	0.00633	0.00239
	(0.0532)	(0.0215)	(0.0515)	(0.0208)	(0.0536)	(0.0212)
t3	-0.00677	-0.00260	-0.00651	-0.00251	-0.00758	-0.00286
	(0.0488)	(0.0177)	(0.0466)	(0.0171)	(0.0491)	(0.0174)
t4	0.0216	0.00829	0.0217	0.00836	0.0214	0.00807
	(0.0430)	(0.0188)	(0.0424)	(0.0184)	(0.0433)	(0.0186)
t5	-0.0341	-0.0131	-0.0338	-0.0130	-0.0351	-0.0132
	(0.0597)	(0.0174)	(0.0567)	(0.0170)	(0.0603)	(0.0172)
t6	0.0279	0.0107	0.0278	0.0107	0.0282	0.0106
	(0.0387)	(0.0164)	(0.0390)	(0.0165)	(0.0398)	(0.0164)
t7	0.000311	0.000119	0.000376	0.000145	0.000113	4.27e-05
	(0.0423)	(0.0163)	(0.0420)	(0.0162)	(0.0431)	(0.0163)
Constant		1.598*		1.606**		1.574*
		(0.835)		(0.788)		(0.826)

Note: Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run. If t is missing, it depends that the value is omitted.

Table A11: ARDL for Combined and Employment

Variables	(LR) Model 1	(SR) Model 1	(LR) Model 2	(SR) Model 2	(LR) Model 3	(SR) Model 3
EC		-0.248***		-0.259***		-0.260***
		(0.0142)		(0.0234)		(0.0226)
CIS	-2.343*		-5.848		-1.373	
	(1.358)		(4.625)		(0.923)	
CIS_{SE}			4.812			
			(4.537)			
CIS_{ME}			4.132			
			(4.676)			
CIS_{LE}					-4.455	
					(4.558)	
Δ CIS		1.374		6.430		0.130
		(1.462)		(4.953)		(0.533)
Δ CIS_{SE}				-7.119		
				(4.932)		
Δ CIS_{ME}				-5.484		
				(4.898)		
Δ CIS_{LE}						6.306
						(4.889)
t2	-0.00726	-0.00180	-0.00528	-0.00137	-0.00511	-0.00133
	(0.0808)	(0.0200)	(0.0772)	(0.0201)	(0.0767)	(0.0200)
t3	0.0711	0.0177	0.0697	0.0181	0.0696	0.0181
	(0.0949)	(0.0235)	(0.0862)	(0.0232)	(0.0859)	(0.0232)
t4	-0.0585	-0.0145	-0.0543	-0.0141	-0.0539	-0.0140
	(0.0574)	(0.0140)	(0.0529)	(0.0140)	(0.0529)	(0.0140)
t5	0.0245	0.00608	0.0247	0.00638	0.0247	0.00641
	(0.0516)	(0.0129)	(0.0481)	(0.0123)	(0.0477)	(0.0122)
t6	0.00427	0.00106	0.00527	0.00136	0.00536	0.00139
	(0.0585)	(0.0146)	(0.0552)	(0.0142)	(0.0551)	(0.0143)
t7	0.0862	0.0214	0.0840*	0.0218*	0.0839*	0.0218*
	(0.0524)	(0.0131)	(0.0480)	(0.0124)	(0.0477)	(0.0123)
t8	-0.00400	-0.000993	-0.00201	-0.000520	-0.00184	-0.000479
	(0.0552)	(0.0137)	(0.0475)	(0.0123)	(0.0474)	(0.0123)
t9	0.0844	0.0210	0.0825	0.0213	0.0823	0.0214
	(0.0957)	(0.0241)	(0.0959)	(0.0236)	(0.0953)	(0.0236)
t10	0.0529	0.0131	0.0520	0.0135	0.0519	0.0135
	(0.0621)	(0.0156)	(0.0588)	(0.0150)	(0.0584)	(0.0150)
t11	0.0212	0.00528	0.0214	0.00554	0.0214	0.00556
	(0.0569)	(0.0142)	(0.0554)	(0.0141)	(0.0550)	(0.0141)
t12	0.0782	0.0194	0.0762	0.0197	0.0760	0.0198
	(0.0661)	(0.0166)	(0.0600)	(0.0158)	(0.0599)	(0.0158)
t13	-0.0256	-0.00637	-0.0238	-0.00615	-0.0236	-0.00613
	(0.0582)	(0.0143)	(0.0552)	(0.0143)	(0.0548)	(0.0142)
t14	0.0915	0.0227	0.0880	0.0228	0.0877	0.0228
	(0.0642)	(0.0162)	(0.0555)	(0.0147)	(0.0553)	(0.0146)
t15	0.0374	0.00928	0.0360	0.00933	0.0359	0.00934
	(0.0596)	(0.0150)	(0.0568)	(0.0146)	(0.0565)	(0.0145)
Constant		1.001***		1.042***		1.046***
		(0.0533)		(0.103)		(0.0994)

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run. If t is missing, it depends that the value is omitted.

Table A12: Fixed effect for Combined and Employment

Variables	Model 1	Model 2	Model 3
CIS	-0.781	-1.018	-0.722
	(0.499)	(1.666)	(0.533)
CIS_{SE}		0.0861	
		(1.874)	
CIS_{ME}		0.505	
		(1.830)	
CIS_{LE}			-0.295
			(1.810)
t2	-0.00454	-0.00454	-0.00454
	(0.00704)	(0.00708)	(0.00705)
t3	0.00790	0.00790	0.00790
	(0.0205)	(0.0205)	(0.0205)
t4	-0.00933	-0.00933	-0.00933
	(0.0222)	(0.0222)	(0.0222)
t5	-0.00445	-0.00445	-0.00445
	(0.0237)	(0.0238)	(0.0238)
t6	-0.00195	-0.00195	-0.00195
	(0.0241)	(0.0242)	(0.0242)
t7	0.0118	0.0118	0.0118
	(0.0273)	(0.0275)	(0.0274)
t8	-0.00221	-0.00221	-0.00221
	(0.0269)	(0.0270)	(0.0270)
t9	-0.00450	-0.00450	-0.00450
	(0.0181)	(0.0182)	(0.0182)
t10	-0.00591	-0.00591	-0.00591
	(0.0190)	(0.0193)	(0.0191)
t11	-0.00893	-0.00893	-0.00893
	(0.0222)	(0.0225)	(0.0223)
t12	-0.0123	-0.0123	-0.0123
	(0.0208)	(0.0211)	(0.0210)
t13	-0.0329	-0.0329	-0.0329
	(0.0207)	(0.0210)	(0.0209)
t14	-0.0272	-0.0272	-0.0272
	(0.0201)	(0.0203)	(0.0204)
t15	-0.0282	-0.0282	-0.0282
	(0.0213)	(0.0215)	(0.0216)
t16	-0.0343	-0.0343	-0.0343
	(0.0222)	(0.0223)	(0.0225)
Constant	4.027***	4.027***	4.027***
	(0.0168)	(0.0171)	(0.0172)
Observations	1,040	1,040	1,040
R^2	0.045	0.046	0.045
Number of gr_is	65	65	65

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. If t is missing, it depends that the value is omitted. gr_is is the industry cluster given size.

Table A13: ARDL for SNI2002 and Productivity

Variables	(LR) Model 1	(SR) Model 1	(LR) Model 2	(SR) Model 2	(LR) Model 3	(SR) Model 3
EC		-0.522***		-0.537***		-0.537***
		(0.124)		(0.131)		(0.130)
CIS	0.715		1.286		0.569	
	(0.589)		(2.321)		(0.618)	
CIS_{SE}			-0.406			
			(2.490)			
CIS_{ME}			-1.028			
			(2.485)			
CIS_{LE}					0.716	
					(2.468)	
Δ CIS		-0.136		2.128		-0.672
		(1.626)		(6.090)		(1.031)
Δ CIS_{SE}				-3.314		
				(5.967)		
Δ CIS_{ME}				-2.287		
				(6.156)		
Δ CIS_{LE}						2.796
						(5.983)
t2	0.0102	0.00533	0.0126	0.00674	0.0125	0.00670
	(0.0745)	(0.0399)	(0.0728)	(0.0404)	(0.0726)	(0.0402)
t3	0.0396	0.0207	0.0401	0.0216	0.0401	0.0215
	(0.0448)	(0.0245)	(0.0446)	(0.0249)	(0.0445)	(0.0249)
t4	0.0848**	0.0443***	0.0837**	0.0450***	0.0838**	0.0450***
	(0.0354)	(0.0163)	(0.0354)	(0.0164)	(0.0355)	(0.0164)
t5	0.0862**	0.0450**	0.0857**	0.0460**	0.0857**	0.0460**
	(0.0416)	(0.0222)	(0.0403)	(0.0222)	(0.0402)	(0.0221)
t6	-0.0515	-0.0269	-0.0479	-0.0257	-0.0480	-0.0258
	(0.0368)	(0.0175)	(0.0351)	(0.0174)	(0.0349)	(0.0173)
t7	-0.0157	-0.00821	-0.0149	-0.00803	-0.0150	-0.00803
	(0.0305)	(0.0160)	(0.0291)	(0.0157)	(0.0291)	(0.0157)
Constant		-0.663***		-0.683***		-0.682***
		(0.163)		(0.171)		(0.169)

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run. If t is missing, it depends that the value is omitted.

Table A14: ARDL for SNI2007 and Productivity

Variables	(LR) Model 1	(SR) Model 1	(LR) Model 2	(SR) Model 2	(LR) Model 3	(SR) Model 3
EC		-0.790***		-0.790***		-0.787***
		(0.0772)		(0.0774)		(0.0768)
CIS	-1.355		1.476		-2.059	
	(1.688)		(4.427)		(1.575)	
CIS_{SE}			-4.133			
			(4.385)			
CIS_{ME}			-1.754			
			(4.446)			
CIS_{LE}					3.556	
					(4.342)	
Δ CIS		-1.527		-2.170		-1.373
		(1.027)		(3.113)		(0.881)
Δ CIS_{SE}				1.014		
				(3.125)		
Δ CIS_{ME}				0.174		
				(3.291)		
Δ CIS_{LE}						-0.805
						(3.094)
t2	-0.312***	-0.246***	-0.312***	-0.246***	-0.312***	-0.246***
	(0.0441)	(0.0391)	(0.0443)	(0.0387)	(0.0445)	(0.0387)
t3	-0.162***	-0.128***	-0.162***	-0.128***	-0.162***	-0.127***
	(0.0311)	(0.0286)	(0.0311)	(0.0281)	(0.0313)	(0.0282)
t4	-0.188***	-0.148***	-0.188***	-0.148***	-0.188***	-0.148***
	(0.0288)	(0.0243)	(0.0292)	(0.0240)	(0.0293)	(0.0241)
t5	-0.178***	-0.141***	-0.178***	-0.141***	-0.178***	-0.140***
	(0.0287)	(0.0232)	(0.0290)	(0.0230)	(0.0290)	(0.0230)
t6	-0.158***	-0.124***	-0.158***	-0.124***	-0.158***	-0.124***
	(0.0291)	(0.0236)	(0.0294)	(0.0236)	(0.0295)	(0.0236)
t7	-0.0576***	-0.0455***	-0.0576***	-0.0455***	-0.0575***	-0.0452***
	(0.0201)	(0.0172)	(0.0200)	(0.0171)	(0.0201)	(0.0171)
Constant		-0.0758		-0.0758		-0.0757
		(0.101)		(0.100)		(0.102)

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run. If t is missing, it depends that the value is omitted.

Table A15: ARDL for Combined and Productivity

Variables	(LR) Model 1	(SR) Model 1	(LR) Model 2	(SR) Model 2	(LR) Model 3	(SR) Model 3
EC		-0.287***		-0.309***		-0.303***
		(0.0330)		(0.0338)		(0.0323)
CIS	-2.309**		1.638		-3.272***	
	(1.021)		(2.162)		(1.095)	
CIS_{SE}			-6.483***			
			(2.204)			
CIS_{ME}			-3.322			
			(2.072)			
CIS_{LE}					4.905**	
					(2.106)	
Δ CIS		0.345		-2.334		1.050
		(0.742)		(1.619)		(0.723)
Δ CIS_{SE}				4.264**		
				(1.763)		
Δ CIS_{ME}				2.525		
				(1.744)		
Δ CIS_{LE}						-3.395**
						(1.641)
t2	-1.309***	-0.376***	-1.285***	-0.398***	-1.292***	-0.391***
	(0.131)	(0.0383)	(0.119)	(0.0405)	(0.121)	(0.0402)
t3	-1.218***	-0.350***	-1.204***	-0.372***	-1.208***	-0.366***
	(0.0960)	(0.0471)	(0.0933)	(0.0466)	(0.0955)	(0.0458)
t4	-1.123***	-0.322***	-1.115***	-0.345***	-1.117***	-0.339***
	(0.0865)	(0.0438)	(0.0832)	(0.0432)	(0.0850)	(0.0421)
t5	-1.122***	-0.322***	-1.112***	-0.344***	-1.115***	-0.338***
	(0.0973)	(0.0415)	(0.0939)	(0.0408)	(0.0962)	(0.0399)
t6	-1.360***	-0.390***	-1.331***	-0.412***	-1.338***	-0.406***
	(0.0881)	(0.0408)	(0.0858)	(0.0406)	(0.0863)	(0.0400)
t7	-1.220***	-0.350***	-1.204***	-0.373***	-1.208***	-0.366***
	(0.0901)	(0.0419)	(0.0853)	(0.0428)	(0.0866)	(0.0417)
t8	-1.166***	-0.335***	-1.154***	-0.357***	-1.157***	-0.351***
	(0.0798)	(0.0393)	(0.0782)	(0.0399)	(0.0789)	(0.0387)
t10	-0.490***	-0.141***	-0.470***	-0.145***	-0.475***	-0.144***
	(0.0882)	(0.0277)	(0.0814)	(0.0279)	(0.0836)	(0.0279)
t11	-0.0604	-0.0173	-0.0732	-0.0227	-0.0698	-0.0212
	(0.0655)	(0.0195)	(0.0610)	(0.0195)	(0.0610)	(0.0190)
t12	-0.254***	-0.0728***	-0.244***	-0.0756***	-0.247***	-0.0749***
	(0.0591)	(0.0183)	(0.0540)	(0.0177)	(0.0553)	(0.0178)
t13	-0.279***	-0.0801***	-0.267***	-0.0826***	-0.270***	-0.0819***
	(0.0723)	(0.0191)	(0.0666)	(0.0191)	(0.0682)	(0.0193)
t14	-0.190***	-0.0545***	-0.183***	-0.0568***	-0.185***	-0.0561***
	(0.0645)	(0.0194)	(0.0597)	(0.0191)	(0.0612)	(0.0192)
t15	-0.0193	-0.00554	-0.0234	-0.00724	-0.0223	-0.00676
	(0.0623)	(0.0180)	(0.0574)	(0.0179)	(0.0589)	(0.0179)
Constant		0.0166		0.0134		0.0143
		(0.0277)		(0.0295)		(0.0302)

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. SR: Short-Run, LR: Long-Run. If t is missing, it depends that the value is omitted.

Table A16: Fixed Effect for Combined and Productivity

Variables	Model 1	Model 2	Model 3
CIS	-2.013**	1.621	-2.922***
	(0.772)	(2.331)	(0.795)
CIS_{SE}		-5.497**	
		(2.312)	
CIS_{ME}		-3.589	
		(2.262)	
CIS_{LE}			4.543**
			(2.271)
t2	-0.0300	-0.0300	-0.0300
	(0.0188)	(0.0194)	(0.0194)
t3	-0.0284*	-0.0284*	-0.0284*
	(0.0145)	(0.0146)	(0.0147)
t4	0.00665	0.00665	0.00665
	(0.0189)	(0.0191)	(0.0194)
t5	0.0306	0.0306	0.0306
	(0.0250)	(0.0250)	(0.0253)
t6	-0.0149	-0.0149	-0.0149
	(0.0286)	(0.0288)	(0.0291)
t7	-0.0135	-0.0135	-0.0135
	(0.0322)	(0.0328)	(0.0333)
t8	0.00274	0.00274	0.00274
	(0.0368)	(0.0368)	(0.0376)
t9	0.772***	0.772***	0.772***
	(0.0511)	(0.0502)	(0.0506)
t10	0.752***	0.752***	0.752***
	(0.0588)	(0.0581)	(0.0583)
t11	0.868***	0.868***	0.868***
	(0.0620)	(0.0607)	(0.0614)
t12	0.880***	0.880***	0.880***
	(0.0582)	(0.0575)	(0.0579)
t13	0.890***	0.890***	0.890***
	(0.0600)	(0.0601)	(0.0606)
t14	0.915***	0.915***	0.915***
	(0.0580)	(0.0581)	(0.0585)
t15	0.990***	0.990***	0.990***
	(0.0624)	(0.0627)	(0.0630)
t16	1.055***	1.055***	1.055***
	(0.0679)	(0.0684)	(0.0689)
Constant	-1.135***	-1.135***	-1.135***
	(0.0215)	(0.0237)	(0.0232)
Observations	1,040	1,040	1,040
R^2	0.860	0.870	0.868
Number of gr_is	65	65	65

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. SE: Small Enterprises, ME: Medium Enterprises, LE: Large Enterprises. If t is missing, it depends that the value is omitted. gr_is is the industry cluster given size.